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THE MICRO USER

Volume 1
Number 9
November 1983
£1

electron user

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Blackjack

Grab a stake in this super gambling game

Goblins: help save the woodland folk

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How to crack the Ascii code

BBC microcomputer

WIN

Acorn's new speech synthesiser

– See Page 67

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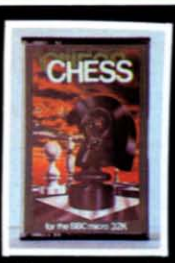

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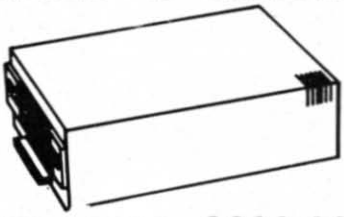

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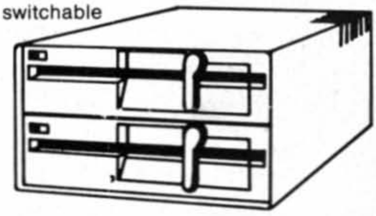

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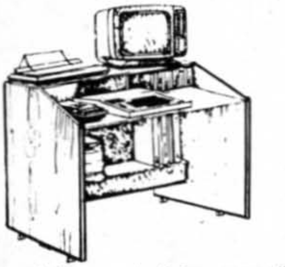

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Access

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Vol. 1 No. 9 November 1983

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Editor-in-Chief of Database Publications:
Peter F. Brameld

Tel: 061-456 8383 (Editorial)
061-456 8500 (Advertising)

Telex: 667664 SHARET G

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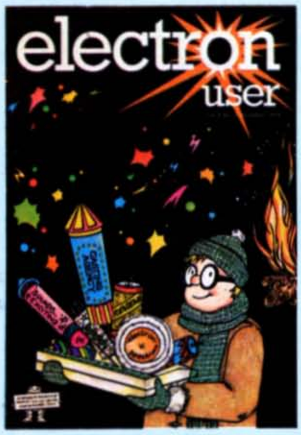

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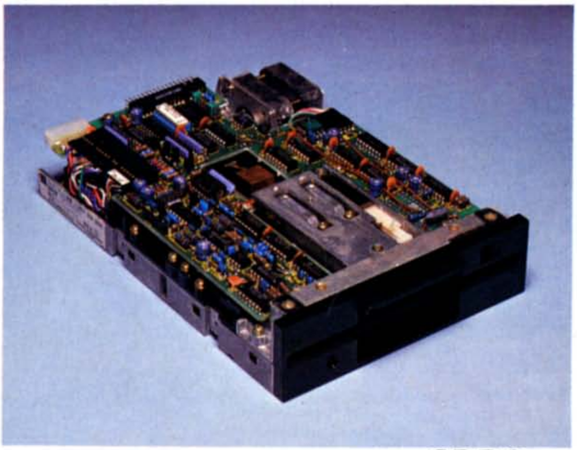

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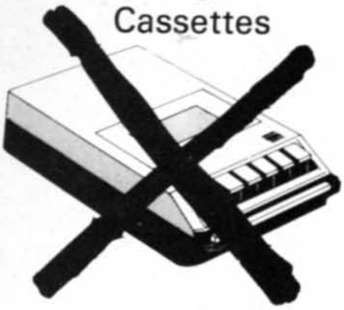

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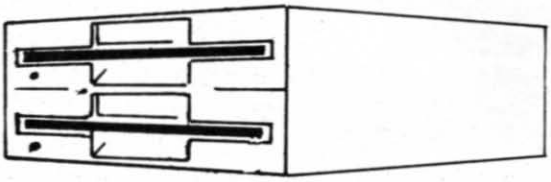

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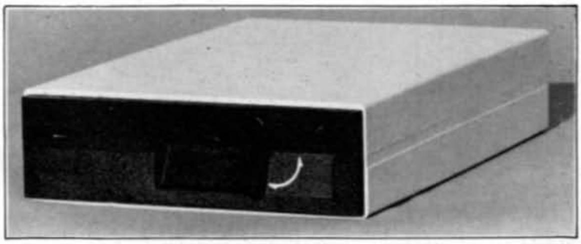

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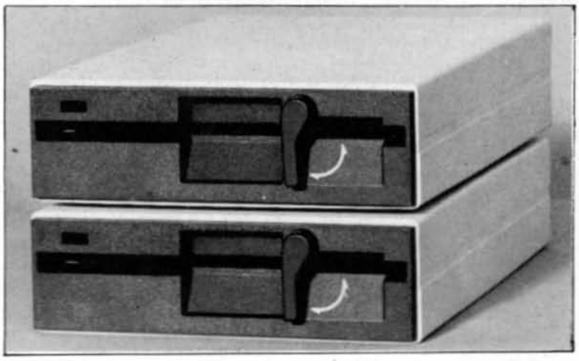

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There follows a list of all the commands in this ROM. These can be entered from the keyboard or can be combined into the user's program. They are also accessible from other language ROMs such as WORDWISE.

***DIS**

This is a very powerful disassembler. Special options allow 'offset' disassembly (which makes the disassembly appear to have come from another address), following of jumps and branches and skip calls to the MOS or BASIC. Output can be directed to file or the printer.

*** DISCTAPE**

This command will automatically transfer files, machine code and BASIC programs from a disc to tape.

*** DOWNLOAD**

Loads a file from tape or disc and moves it to any address. The normal address is &E00 allowing programs to be run on Disc systems without any loss of memory.

*** DSEARCH**

Will search the current disc for a string of characters or any sequence of bytes. The search starts from any track. When found the disc editing routine (DZAP) is entered.

***DZAP**

This is a disc editing routine that displays any sector of the disc. The cursor may be moved around the sector and new values can be entered in hex, decimal or binary or as ASCII text.

***EDIT**

Displays the contents of any function key for editing, so that long and complicated *KEY definitions do not have to be entered from scratch every time any alteration is needed.

***FIND**

Allows a BASIC program to be searched for any string, such as variable or procedure names, displaying all line numbers in which that string occurs.

***FORM**

Formats blank discs to any number of tracks. Options allow only specific tracks to be formatted. One special option will format discs that can have dual catalogues allowing 60 files per side of the disc.

***JOIN**

This will join one or more disc files together as one file. It may also be used for making copies of any file on the disc.

***MENU**

Typing *MENU or pressing M-BREAK will display a menu of all files on the disc saved under a special directory. Simply selecting one of the menu options will load and run the program.

***MOVE**

Moves a BASIC program from any page to any new page in memory. Amongst many other uses this allows programs on disc machines to be moved to &E00.

***MSEARCH**

Searches memory starting at the given address for any string or sequence of bytes. If the string is found, the area of memory is displayed with the memory editor (MZAP).

***MZAP**

Very much like the disc editor, this displays a window into memory. Once the cursor has been moved to the correct byte, new values may be entered in hex, decimal, binary or as ASCII characters. The window may be scrolled up or down through memory.

***PARTLOAD**

Allows any part of a file to be loaded into memory. This would allow a very large file to be split up into more manageable units.

*** RECOVER**

Any number of sectors can be loaded from the disc into memory with this command. Allows the recovery of any data from the disc such as deleted programs etc.

***RESTORE**

The opposite of the above command. Puts back directly onto the disc any section of memory.

*** SHIFT**

Used to move any section of memory to any other address.

SWAP

This swaps catalogues on special dual catalogue discs, allowing up to 60 files per side of a disc — almost twice the normal.

***TAPEDISC**

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- Which Micro & Software Review, August

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- Popular Computing Weekly, 12 May & 23 June

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If you want to know more about the Hobbit before you make up your mind send to the address below for more details, or order the manual and see just how sophisticated the Hobbit really is.

If you have a different make of computer, but are interested in the Hobbit system, send us a stamped addressed envelope and details of your computer so that we can send you advance information of new products when they become available.

Available from most good computer shops or direct from:- IKON COMPUTER PRODUCTS, KILN LAKE, LAUGHARNE, DYFED. Tel. 099 421 515. BBC Hobbit £135.00 + £3.00 p&p. BBC Second drive £120.00 + £3.00 p&p. Zero Memory Option £25.00 (£18.00 if ordered with the Hobbit). Power Supply £12.00. Manual (ordered separately) £1.50 (No VAT; refundable on purchase of Hobbit). Nascom Hobbit (unboxed) £120.00. Nascom second drive £94.00. Basic Upgrade Kit £10.00. Box of 6 cassettes £17.50. Cleaning cassette £3.50. Please add VAT at the current rate to the above prices. ACCESS AND VISA ACCEPTED.

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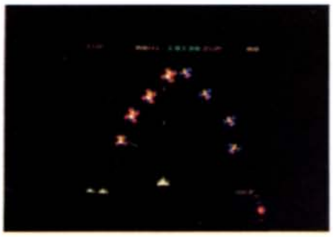

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Seated at your computer, streams of multi-coloured aliens swirl past your laser-base into formation. The first squadron appears harmless, but later waves will avenge the deaths of their comrades with increasing ferocity. To combat the swooping bomb dropping meanies, you may try to link up a pair of laser-bases and **double your fire power!** Your progress through successive phases will be rewarded by challenge stages, where large bonuses may be earned. The game builds up to a dizzying crescendo of high speed motion where instant reflexes and pure technique are your only hope of survival. . .

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ARE YOU SERIOUS?

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REPLICA is the fastest selling disc utility for the BBC Micro and THE KEY is a close second—BUT WHY?

REPLICA and THE KEY give you, the user, what you want. You have bought your disc drives and now want to take advantage of them, but most of your favourite software will not run with the disc interface and even if you are prepared to pay out for disc versions of everything you can't get them and if you have 80 track drives you might as well give up. If you know everything about the DFS, memory locations, saving procedures etc, you can probably save some of them onto disc. What's a half hour per program, and it only takes a few minutes to find, load and relocate it each time (if you can remember the sequence).
On the other hand you could buy REPLICA, enter a few details i.e. 1) program name, 2) number of sections, 3) CHAIN, *RUN or *LOAD 4) press play and then make a cup of tea whilst the program loads from cassette for the last time. When you return the program will be on the disc and shown in a menu under the name you gave it. There are now eight alternative storage methods and one of them will work with most programs. There are some exceptions but the outstanding sales figures for REPLICA indicate that they are not relevant. Many users have purchased 4 or 5 copies of REPLICA and it is now the recognised format that dealers use to display their software.

REPLICA will hold 8/10 programs on each disc, they can be erased if required and a new batch saved, but why not just buy another REPLICA and keep your programs on disc permanently (it costs about £1 per program).

REPLICA £**9.95** (state 40 or 80 track)

THE KEY

THE KEY provides you with the facilities that should have been included in the Disc Filing System and also helps you reach the parts other discs can't reach. This new version of THE KEY has been made compatible with ECONET at the request of many schools, colleges and universities. The whole program has been turbocharged and the facilities are:

1) FORM40 – now much faster.
2) FORM80 – now much faster.
3) BACKUP – has that effect on some people because it allows even most of the protected discs to be backed up – faster too.
4) EDITOR – display, read and alter sectors, even if you can't list the program. Highlight any byte whilst searching, make additional searches, edit bytes – now allows entry in HEX or ASCII and in string format. Dump a sector to printer, file pointers etc etc. You can now see how data is stored on a disc and alter it if you wish. Of course, it's also faster.
5) RETRIEVE – don't despair when you have a corrupted disc or if a program is accidentally deleted, using RETRIEVE your worries are over.

With so much from one utility it is no wonder that THE KEY is outselling programs that cost the same but provide far less.

THE KEY **£12.95** (state 40 or 80 track)

GRAFKEY/GRAFDISK

The first and best CAD program for the BBC Micro. Used in education, business, art, video etc. Recommended by LASERBUG, BBC MICRO USER, PCW, SOFT and thousands of satisfied users (see earlier issues of BBC Micro User for screen pictures). In a comparative review of the major CAD programs PCW said: "Considering the options it is by far the best value". Need we say more, if you need a graphics utility then this is it.

GRAFKEY (joystick & keyboard) **£7.95**
GRAFDISK (state 40 or 80 track) **£12.95**

SHADOW

A tape cloning program that will enable you to make security back ups of your valuable cassette based software.
SHADOW works with 99% of all known programs including those with "locked" sections or those containing 300 BAUD sections. Handles programs of any length and works with any operating systems.
SHADOW is the definitive tape backup system. Also on the same tape is a very useful program called "INSPECTOR" which allows the user to page through memory, search for a string, etc.
BOTH PROGRAMS £8 incl.
(This program for personal use only).

JOYSTICK UTILITY

Converts non-joystick programs to work with joysticks. Works with any program using INKEY(-), which applies to most programs. Easy to use, just press the keys you want to transfer. Supplied on cassette but can be transferred to disc.
CASSETTE **£5.00**

SINGLE KEY ENTRY

Requires 1.2 O.S.

A very useful utility that provides single key input of 66 key words. Just like having 66 function keys. Compatible with issue 1 & 2 basic and discs.
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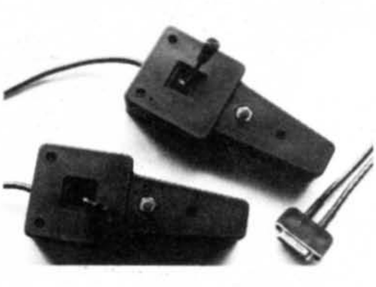

EDUCATIONAL CORNER

(for the 5-11 age group)

THE GARDEN – 3 programs with superb graphics. Covers: colours, spelling and understanding. Cassette £6.95

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INTRO – A simple programming language which uses the immediate visual response of "Turtle" graphics to introduce a number of programming concepts and techniques. Cassette (and 9 page manual) £7.95

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GSL COMPUTING NEWS

NOVEMBER 1983

ISSUE 1

A GSL COMPUTING PUBLICATION

GSL'S WINCHESTER SYSTEM INCORPORATES THE AMCOM WINCHESTER FILE SERVER

The complete system is compact and easy to use

Amcom's WFS is a versatile filing system enabling the use of Winchester Hard Disc drives on the BBC micro. The WFS is supplied in EPROM, and supports all the O.S. and BASIC file handling calls.

The following commands are supported:

- BACKUP
- DEFSUB
- EXEC
- LOAD
- RUN
- BUILD
- DELETE
- GOSUB
- OPT
- SAVE
- CAT
- DIR
- HELP
- REMOVE
- SPOOL
- CLEAR
- DRIVES
- INFO
- RENAME
- TITLE
- COMPACT
- DUMP
- LIB
- RETURN
- TYPE
- COPY
- ENABLE
- LIST
- RETRIEVE
- WIPE

The disc has a main catalogue, and although this can contain files, it is more convenient to use the command *DEFSUB to define sub drives, the main catalogue can contain up to 63 subdrives. These drives can be of any size between 1K and the full disc size, and can contain up to 255 files, both these drives can be set when the drive is defined. As well as containing files these drives can themselves contain further levels of sub-drives, and up to 4 levels of nesting are allowed. This effectively means that there is no limit to the number of files that may be stored on the disc, (strictly less than 1000 million).

The command *GOSUB is used to go to a subdrive, and future catalogue and LOAD/SAVE operations will access just this subdrive. *RETURN allows you to return to the hierarchial level above.

This structure built into the WFS enables a sensible and manageable division of these enormous drives into usable units in a way that is transparent to the user, and highly flexible. An 8 Megabyte drive can be configured so that it appears as one enormous drive, or as 80 100 Kbyte drives, or as 4 drives each containing 20 drives, each containing 10 10K drive etc!!!

Facilities are provided for backing up the contents of important subdrives to minifloppies, and the WFS allows the machine to have both Hard and mini disc connected.

Apart from the obvious advantage of large disc size the WFS is also fast, versatile and easy to use.

64K printer buffer for Acorn Micro

THIS UNIT IS A SELF-CONTAINED UNIT with its own power supply. It enables the Micro to down load 64K of print and be used for other work whilst the printer is in operation.

The unit has been especially designed for the Acorn BBC Microcomputer with Acorn style connectors to enable use of existing leads. The print-buffer has a self check on power up and is completely transparent to the user. The buffer is not enabled without the printer connector.

A NETWORKING MARRIAGE FOR THE BBC MICRO FROM GSL AND AMCOM

AMCOM'S E-NET is a flexible network filing system for the BBC microcomputer, specially designed in conjunction with GSL for Education use. It uses the network interface in the BBC machine so that if you already have networked machines it only requires fitting a new ROM in each clients machine and installing the Hard Disc Unit. (If you do not have network B's then a network interface has to be fitted to each machine).

E-NET allows up to 200 computers to share a common, large central disc store, and overcomes many of the inconvenient features of earlier network systems.

E-NET uses a hard disc unit as the central disc store, allowing upwards of 8 Megabytes of storage. It has effective, simple structures to limit the disc space available to any user, and to permit access by any user to library programs. Many users of the few simple networks installed so far have complained of the difficulty of monitoring pupil's use of disc space, but E-NET overcomes all these problems by doing the monitoring for you. You simply allocate a space limit to each user on the Hard Disc using the simple command program. For most schools and colleges this size disc will allow each user to have a reasonable file store, but it can be extended if required by adding further hard disc units. Important files can be easily copied to minifloppies if required.

E-NET has many useful extra commands. For example a simple command which only operates from the master (teacher's) machine, and which forces each client machine (in a certain specified room or area) to load and run a particular program is included. This is very fast, and flexible, and allows for efficient use of C.A.L. packages. Care has been taken to ensure that the command structure is simple enough not to intimidate the non-specialist, while remaining flexible and robust.

Rod Lewis, GSL's Sales Manager, discussing E-NET's speed, simplicity and versatility with a customer

E-NET allows one or more printers to be connected to the network and although this is connected to one of the network computers this computer can still be used even while the printer is in use.

E-NET is fast, simple to use and versatile. The first system being installed for use in September, and demonstrations can be arranged.

Winchester Disk System is a Breakthrough

THE GSL WINCHESTER DISK SYSTEM represents a remarkable breakthrough in the expansion of the BBC Micro Computer Storage Capacity. Originally supplied to the Ministry of Defence. GSL can now make the system available to Educational Establishments in Industry.

The GSL Winchester Disk System is a self-contained unit using 5¼" or 8" hard disk drives to provide up to 340M Byte of storage (unformatted). The standard unit also contains power supplies, SASI disk controller, and GSL host adapter card. The only connection to the micro is via the 1MHz bus.

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BBC34D	Dual double sided 80 track disc drive 40/80 track switchable	603.75

All disc drives supplied with connecting cables, utilities disc and manual.

BBC Microcomputer Compatible Floppy Discs

BBC40TS	Single sided 40 track discs Box of 10	17.25
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BBC7	Econet interface kit	70.00
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BBC Microcomputer Econet Accessories

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B.Y., London

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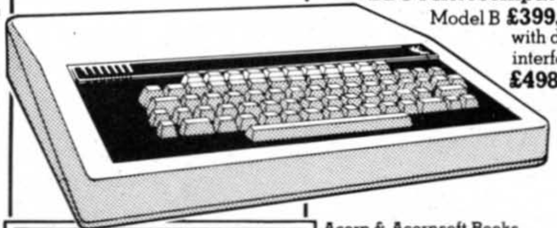

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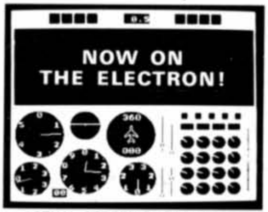

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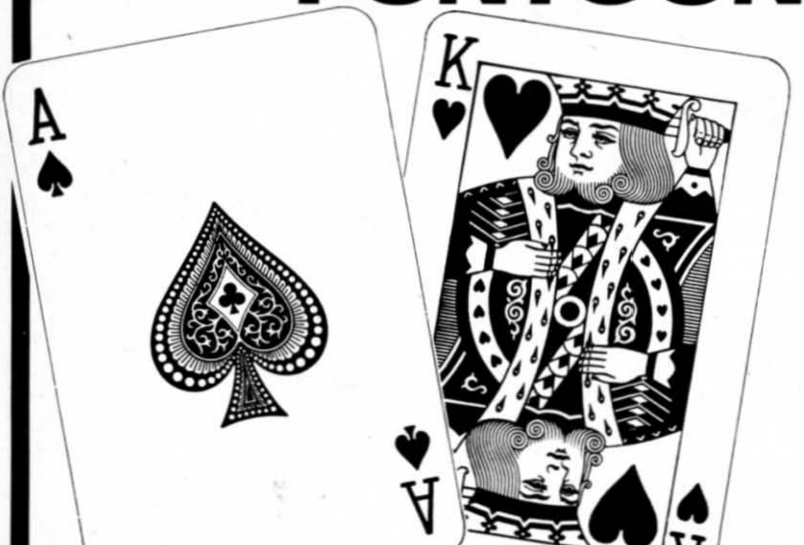

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THE MICRO USER

November 1983

NEWS

NOW ACORN EMPIRE IS WORTH £134.8m

New multi-millionaires Chris Curry and Hermann Hauser: Now they're laughing all the way to the bank?

It only took five years to do it

CHILDHOOD dreams of little acorns growing into giant oaks have come dramatically true for the two men who have created a multi-million pound business out of the BBC Micro.

Acorn bosses Hermann Hauser and Chris Curry made Stock Exchange history last month when 10 per cent of the company's shares was put on sale.

It was the biggest flotation the Unlisted Securities Market had ever known, and it capitalised the whole company at £134.8 million.

Not bad for a company which was launched only five years ago.

In its first year Acorn had a £31,000 turnover, made £3,000 profits, and 29 year old Hermann and 32 year old Chris shared a take-home pay of £2,000.

The award of the contract to make the BBC Micro, in the spring of 1981, was to make their fortune.

In the year ended last July turnover had soared to £42.3 million, profits to £8.7 million – and their joint take-home pay amounted to £81,000.

But even that is chickenfeed compared to the rewards that come from taking Acorn to market.

They each collect around £3.3 million and retain shares worth well over £60 million.

They have also given themselves three-year service agreements which will net them an annual salary of £60,000.

And on the subject of spreading around the largesse, one mustn't forget how well the BBC itself has done out of its association with Hermann and Chris.

The Corporation gets a modest royalty on every machine sold. When the contract with Acorn was signed no-one expected the income from the deal would make much impression on the balance sheet.

But in the first full year's trading the BBC made £452,000, and in the last 12 months it raked in a mammoth £3,575,000.

BIG BEEB DOLLAR BOOKINGS

ACORN launched the BBC Micro onto the fiercely-competitive educational market in the USA in the face of dire warnings from many quarters that it was a recipe for disaster.

But a jubilant Harvey Lawner, Acorn's top man in the States, told *The Micro User* they had already booked $8 million (£5.53 million) worth of business.

And that was before the official USA marketing campaign had got under way.

Now the company believes it is well on course to reach its target figure of $40 million (£26.67 million) – ten per cent of the total market share – in its first year.

Chris Curry, managing director of Acorn, said his company expected to make "serious inroads into Apple's domination of the American market".

Acorn's spectacular early success has been achieved despite jibes from American experts that the British company would end up with egg on its corporate face.

The prestigious Wall Street Journal quoted Clive Smith of Boston's Yankee Group, a leading market research concern: "I'm not sure why

Turn to Page 22

China to buy BBC Micro?

A VAST new market could soon be opening for the BBC Micro – the Republic of China.

This is the confident prediction of Wongs International, the Hong Kong company which manufactures the BBC micros destined for Australia and the Far East.

Said managing director Raymond Yapp: "We are negotiating with the People's Republic to sell the BBC Micro there, and the Chinese government is currently evaluating Acorn's Econet system for linking BBC Micros." Wongs will also be producing BBC Micros for the American market. Acorn has placed a $45 million contract with them, and 50,000 computers will be produced over the next year.

"A new, up-to-date machine should have no problem gaining a firm place in the market once the customer has had a chance to see its clear superiority over less sophisticated rivals", said Mr Yapp.

BBC's telesoftware service is launched

At the launch ... Aubrey Singer, Lawson Brown and John Butcher MP

THE BBC's new telesoftware service was officially launched on September 20.

An extension of Ceefax, the service will allow users anywhere in the country to download free software from the airwaves using their BBC Micro and the Acorn teletext adapter.

Said Lawson Brown, telesoftware organiser: "It provides a fast, cheap, reliable method of distributing software to education, in its widest sense, and to the general public".

At present the main aim is to service the needs of education.

To this end the service will work closely with the BBC's Educational Broadcasting Department.

Already some schools' programmes are planned which will use software downloaded via the teletext adaptor.

A major supplier of programs will be the Micro-electronics Education Programme, the government-funded computer education project.

Another supplier will be Brighton Polytechnic, which has carried out a two year research project into the use of telesoftware in secondary schools.

This is being followed up by a similar project in primary schools which

Education is the main aim

promises to be a fruitful source of software.

This joint Acorn/BBC project gives Britain world leadership in the field of telesoftware.

Said John Butcher, MP, Parliamentary Under Secretary of State responsible for teledata: "Outside the UK they've not the foggiest how we got to this position so quickly".

The BBC intends to maintain its lead. Speaking at the launch, Aubrey Singer, managing director, BBC Television, pointed out that "it is intrinsically more efficient to send data or software over the air than through the post or over a counter".

He envisaged the telesoftware service opening up "all sorts of interesting possibilities".

Regular software transmission has already begun, using Ceefax pages 700 to 706 on BBC1.

Now that the teletext adapter is becoming readily available, BBC Micro owners can, for the price of a teletext adapter, pluck free software out of thin air, as well as having access to all the normal Ceefax facilities.

After Virgin, HMV

RECORD companies are beginning to move into the field of computer software in a big way.

Following Virgin Records' entrance into software production, HMV has opened a computer software department on the first floor of its largest shop in London's Oxford Street.

They will carry a stock of some 70 titles for each of nine different machines including the BBC Micro.

On hand will be computer experts who will answer any questions the public may have about computers and computing in general. They will also advise on the different games available.

W H SMITH CHAIN EXPANDS

DEMAND for the BBC Micro and its software has been so great that W H Smith has decided to expand its distribution.

Presently the firm has 250 shops selling micros, software and computer magazines, though the BBC Micro is only retailed in its three specialist Computer Shops.

Sales have so exceeded expectations that they intend to open a further 28 Computer Shops at major branches around the country.

DOLLAR BONANZA

From Page 21

they've targeted the education market here. It seems a shortcut to disaster".

Additionally, some US analysts have already gone on record as stating that the BBC Micro is overpriced.

From Acorn's American headquarters in Woburn, Mass, Harvey Lawner set the record straight.

"Everyone is entitled to their opinions but we are already proving them wrong", he said.

"To achieve such sales when we're only just beginning to establish ourselves here speaks for itself.

"And we had achieved these sales even before we launched our three million dollar (£2 million) advertising campaign.

"So we are very optimistic about our future here".

Asked why Acorn is already faring so well in the face of competition from the already well established American market forces such as Apple, Commodore and Radio Shack, Lawner said:

"We are offering a complete solution as opposed to just a box. For when they deal with us, they get the complete package to suit their needs.

"That is our strength and we intend to make sure we capitalise on it".

Telesoftware transmission schedules

	Until October 13
SHELL1 SHELL2	*Two versions of a shell-sort for use as programming "tools".*
ANAG1 ANAG2	*Word anagram games of increasing difficulty.*
BOX	*Word shape recognition.*
MATCHES	*Word shapes for non-readers.*
TRUCK10	*Understanding the base 10 number system.*
	October 14 to 27
QUICK	*Quicksort routine for use as a 'tool'.*
WATCHP	*An educational logic game, based on the journey of a watchman touring a town.*
SYMMET	*A program to develop the ability to identify axes of symmetry.*
BUILD	*Construct your own 3-D shapes.*
ORDMAP1	*A program based on ordinance survey maps.*

Great Games Fro
Free magazine with every tape bought

Sheriff tackles Robin

THE Sheriff of Nottingham comes to grips with Robin Hood once more. Not with bow and arrow but with a BBC Micro.

Our picture was taken at the BBC Micro User Show in Nottingham when the real-life Sheriff (Councillor Dennis Birkinshaw) tried out for himself the fast-moving Robin and Marian game that appeared in the September issue of *The Micro User*.

With the Sheriff is Mrs Birkinshaw, computer freak Linda Dobson dressed in Robin Hood outfit, and the game's author, 20 year old Mark Smiddy.

The highly-successful three-day Nottingham Show attracted more than 10,000 people, including many parties from schools throughout the East Midlands. Many new programs were on display.

● **Next month the BBC Micro User Show moves to London – to the prestigeous Westminster Exhibition Centre. It opens at 10am on Thursday, December 8, and lasts four days.**

Readers of The Micro User can save £1 off the adult admission price by using the voucher printed on Page 37 of this issue.

Teletext now on tap

THE teletext adapter, Acorn's latest BBC Micro add-on, has reached the shops at last.

Already 600 have been distributed to meet advanced orders, and Acorn plans to be producing some 500 a week by the New Year.

The adapter will allow BBC Micro users to download programs currently being broadcast on Ceefax on BBC-1.

These can then be run, stored and retrieved like any user-written program.

Not only will the adapter give access to this free software but it will also allow the micro to receive the normal teletext services on Ceefax and Oracle.

You can even access teletext pages from your own programs, as simply as calling a file from disc – a feature designed to appeal to the educational market. Cost of the adapter is £225.

Cylon comes under attack

CONNOISSEURS of the ironic had a good weekend at the Nottingham Micro User Show.

The Manchester firm of A&F Software produced their new game "Cylon Attack", which has a feature new to BBC Micro games – a 50 place high score table which can be saved at the end of the game.

A&F maintains that this table is unbreakable and that no one will be able to enter false scores into it without it being detected.

The firm is so confident that it has offered a £200 prize for the person who has the highest score on March 1, 1984.

As a sampler A&F offered a £25 prize to whoever got the highest score over the weekend. And this is where the irony comes in, for they reckoned without 14-year-old Andrew Simpson.

Andrew is the eldest son of a director of rival games firm Micro Power and acts as a "test pilot" for their new games.

He wandered over to the A&F stand and used his considerable experience to run up a high score of 22,320 before an admiring crowd and an aghast band of A&F dignitaries.

Despite numerous attempts over the weekend the high score remained and A&F had to part with £25 to their competitors.

"Still", murmured an A&F programmer with a mouthful of sour grapes, "it shows he'd rather play our games".

Andrew wasn't there to reply. He was laughing all the way to the bank.

Room for ROMs

NEW from APTL is a sideways ROM board for the BBC Micro. Sidewise, as it is known, allows the user to add up to 15 ROMs to his micro.

One unique facility is a 16k CMOS RAM option, which may be battery backed. This allows software for sideways ROMs to be developed in a true "sideways environment" before being transferred to EPROM.

Another use of the RAM is to allow the user to build up files of sideways ROMs which may be then downloaded into the RAM.

This effectively permits the user to have access to as many sideways ROMs as he wishes.

The unit, which requires no soldering to fit, features full buffering of address and data buses.

LINK-UP STARTS NEW TREND

PAUL Beverley's fascinating article on linking two BBC Micros together via the RS423 port *(The Micro User,* October 1983), has aroused tremendous interest.

Most people, it seems, hadn't realised how simple the BBC Micro made the use of the RS423 port.

The largest response came from game players. Truly interactive tank battles or dog-fights become possible with this technique. Wargamers can now fight whole battles with an electronic umpire, each "general" only seeing his side's view of the battle.

Adventure freaks have been looking on it as a means of expanding the memory store of the BBC Micro to make their quests even longer. Others have pointed out that linking micros together allows you to add graphics to normal size adventures.

Networking

More serious suggestions have been to use it as a way of adding a "second processor", or as a rudimentary networking system. Several people are planning to translate Paul's routines into machine code.

At Micro User, we've been so impressed that we're going to give an RS423 connector lead to help develop the best six ideas we hear of.

So, if you, your school or your user group have got an idea for a project that involves linking two BBC Micros, but you haven't got the connector lead, why not write in with details of your plan, before November 30 to LINK UP, The Micro User, Europa House, 68, Chester Road, Hazel Grove, Stockport. SK7 5NY.

COMPACT'S BUNDLE

PART of the "bundled software" to be released with Acorn's Z80 second processor will be Compact Software's system generator, Nucleus.

Nucleus is a program development tool aimed at the average businessman. With it he can create his own software packages, avoiding the intricacies of actual programming and debugging.

Compact are also developing a day book package for Acorn.

AFTER RUBIK...

HAVE you ever wondered what happened to those schoolkids who could sort out a Rubik cube in ridiculously short times?

The answer is that they have moved on to programming micros.

One such juvenile genius, Patrick Bossert, published his first book, "You can do the Cube", when he was 13.

Now, at the ripe old age of 15, he has brought out a second work called "Microgames". Published by Puffin, the book contains listings of arcade-type games written by Patrick, who is pictured here signing copies of his work for admiring fans.

They have ways of making you talk

IT seems likely that fairly soon we'll be having a barber's shop quartet of BBC Micros, each with a different speech synthesiser.

This is because two new models have just appeared on the market, but they can hardly be called rivals as they are both produced by the same firm, RPS Electronics, of West Yorkshire.

The cheapest, retailing for about £40, is the Microtalker.

It plugs into the BBC Micro's user port and has a simple driver routine of about three lines of assembler.

This is CALLed from Basic and the manufacturers claim that it can easily be programmed to Basic to speak any word in the English language.

The more expensive device is the Univoc at twice the price.

It has an unlimited vocabulary and allows 256 levels of speech inflection, giving the user fine control over the pitch of the spoken output.

This allows the Univoc to avoid the monotones of other speech synthesisers.

MICRONET RECORD

MICRONET, the telesoftware service available to BBC Micro owners over the Prestel network, has set a record in its fifth working month.

Started last March, Micronet 800 recorded over one million accesses from its users in the month of July.

No other information provider on Prestel can claim this number of frames accessed.

TEMPORARY MATE

PROBLEMS have arisen with Acornsoft's new Chess package. Some 500 had been delivered when a minor and rather elusive bug was found.

"You could play the game thousands of times without coming across the bug and it's not all that bad when you find it", said an Acorn spokesman.

"It all depends on your definition of a bug. As it is, we have a reputation for quality to preserve so we are halting sales for a brief period until the error is corrected".

Cumana heads for the high streets

Cumana's Don Bolton: Now into the high streets.

FIRST peripheral manufacturers to follow the lead of firms like Sinclair and Acorn and launch their products in high street stores are Britain's market leaders in disc drives, Cumana.

Their range of slimline drives, until now only available through mail order and specialised dealers, have been given colourful "shelf appeal" packaging.

And chairman Don Bolton, a former calibration engineer who has built up a company with a £10 million turnover, predicts monitor and printer suppliers will follow his lead into the high streets.

"The home computer market is one of the most exciting growth areas in today's economy, with a huge expansion potential", he said.

BARRY WOOD'S TAILPIECE

WELL after their first software offerings we all thought they couldn't organise one, but at the launch of their latest set of programs, BBC Soft really did manage to lay on drinks in a brewery...

* * *

I'm not normally so naive. I'd always thought that Acornsoft's Hopper (an excellent version of the arcade game, Frogger) was so titled to avoid confusion with all the other Froggers on the market.

I had forgotten, until someone very close to Acorn pointed it out, that one of their directors is called ... yes, you've guessed it – Hopper.

* * *

I HAD a nasty few minutes at the Nottingham Micro User Show. Some of the Acorn staff – who're always asking our beloved editor if I really exist – very nearly cornered me.

Fortunately I was able to escape into Sherwood Forest, where, of course, they couldn't see the Wood for the trees.

* * *

HAVE any of you disc owners out there noticed Wood's Second Law? This states that, given a set of N discs, there are always N–1 paper wallets for them to go into.

* * *

IT'S incredible! I've seen men who calmly cruise by police cars doing 90 on the motorway, men who quite unashamedly leave the pub when it's their round – in short, men as grasping and insensitive as our editor – I've seen such men reduced to quivering wrecks of embarrassment and shame when someone's noticed a GOTO in their listings.

I think it's time that those of us who resort to the odd GOTO in our programs came out of the closet. So I'm going to launch a new magazine entitled GOTO USER ... it's bound sell.

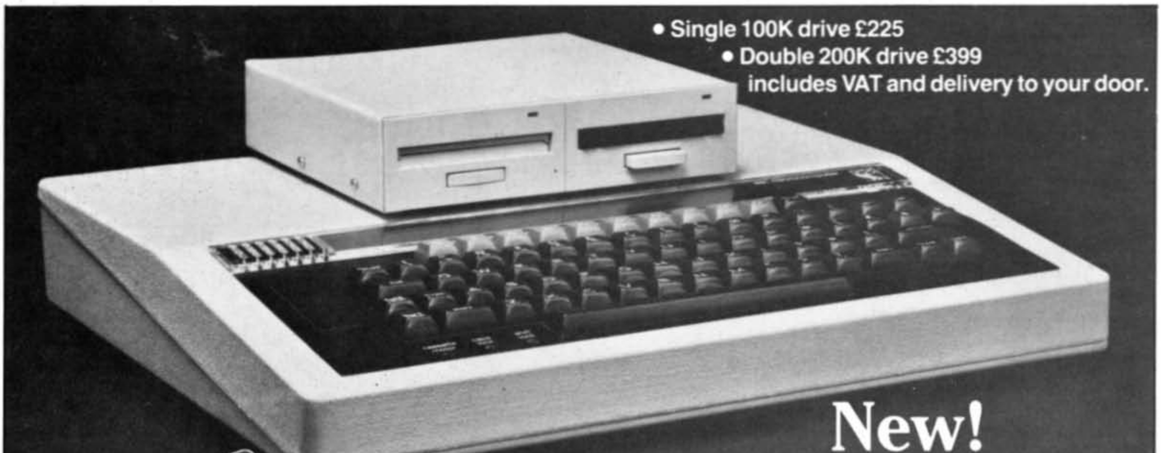
* * *

AFTER all the hullabaloo about Acorn's speech chip being the first with an English accent, they're remaking it with an American accent for their launch in the States. No doubt on power-up it will play the Star-Spangled Banner.

* * *

I HEAR that there are going to be 60,000 Electrons in the shops before Christmas, and that there are no production difficulties. And I believe it, I really do.

Question is, would the three wise men?



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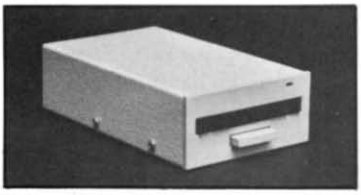
3″ – The new standard
Japan, home of the major disk drive manufacturers, has decided to make the new 3″ disks a standard. And no wonder. Not only are they strong and easily stored, they give 100K per side, and you simply flip them over in the same way as a music cassette. The small light on the casing reminds you which side you are using.

The disk is totally encased in rigid plastic, with no exposed surfaces, is easily inserted with one hand and simply removed by pressing the eject button. A unique feature of the new disks is a mechanical tab which prevents overwriting of precious data. And of course, you can switch it back when necessary.



Reliable and robust
The Hitachi boasts a brush-less direct drive motor, the best possible system for trouble free use. AMS-3 units simply run off the BBC power supply – they don't need their own supply and there's no need to worry about corrupt data.

The standard interface lets you use the disk drive with most other computers in tandem with 5¼″ drives.

High Speed Access
The disk drive provides a track-to-track access time of only 3mS, much faster than old fashioned drives.

The AMS disk drive works with all DFS and disk upgrade kits.

Excellent Manual
Included with your drive will be an easily understood 80pp user guide, with full explanation of the BBC Disc Filing System (DFS).

How to order
If there isn't a stockist near you – just fill in the coupon below, and we will send your order with our full no-quibble money-back guarantee or ring (0925) 62907 for 24 hour service.

Advanced Memory Systems Ltd,
Woodside Technology Centre,
Green Lane, Appleton,
Warrington, Cheshire WA4 5NG

*Disk drives supplied by Hitachi Europe Ltd.

TO: Advanced Memory Systems Ltd, Woodside
Technology Centre, Green Lane, Appleton,
Warrington, Cheshire WA4 5NG.

Please send me by door-to-door courier:

_______(qty) AMS-3 (S) single disk drives at £225 each with free disk.

_______(qty) AMS-3 twin disk drives at £399 each with free disk.

(Prices include EPROM, utility disk, cables, manual, VAT and delivery).

Please send me by post, if not with drives:

_______(qty) double sided (100Kx2) disks at £4.95 each.

_______(qty) packs of five at £22.50 per pack.

_______(qty) utility EPROM at £15.

I enclose a cheque for £ ___________

or debit my credit card

No. ___________

Name ___________

Address ___________

Post Code ___________ Tel No. ___________

Signature ___________

Please allow up to 28 days for delivery.

***A+B Computing (Sept)* stated – "excellent manual"... "its simplicity of use must recommend the Hitachi 3″ drive to anyone about to purchase a disk drive"... "the microdisk is a marvellous change" Personal Computer News "protective sleeve and hard plastic exterior provide for greater protection"... "far more durable and easy to handle than normal drives"**

WATFORD ELECTRONICS

CARDIFF ROAD, WATFORD, HERTS, ENGLAND.

Tel: Watford (0923) 40588/37774 Telex: 8956095 WAELEC

BBC MICROCOMPUTER

Model A—£260

Model B—£346

Upgrade your Model A with our Upgrade Kits and save yourself £ s s s

● BBC1 16K Memory (8 x 4816AP-3 100nS)	£20.00
● BBC2 Printer User I/O Port	£7.10
● BBC3 Disc Interface Kit	£85.00
● BBC4 Analogue I/O Kit	£7.25
● BBC5 Serial I/O Kit	£7.50
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Dust Cover for BBC Micro

Protects your expensive Micro from foreign bodies. **£3.95**

DISC DRIVES (CUMANA)

BBC COMPATIBLE

- **New TEAC** Slimline Uncased Drive S/S 40 track, 5¼", 100K **£135**
- **New TEAC** Slimline Cased without PSU, S/S, 40 track, 5¼", 100K **£155**
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- **CD50A – TEAC** Twin Cased with own PSU, S/S, 40 track, 5¼", 200K **£350**
- **CS50E – TEAC** Single Cased with own PSU, S/S, 80 track, 5¼", 200K **£250**
- **CD50E – TEAC** Twin Cased with own PSU, D/S, 80 track, 5¼", 400K **£475**
- **CS50F – TEAC** Single Cased with own PSU, D/S, 80 track, 5¼", 400K **£310**
- **CD50F – TEAC** Twin Cased with own PSU, D/S, 80 track, 5¼" 800K **£599**
- **MITSUBISHI** Slimline – Uncased, double density. Double track, 5¼", 1 Megabytes, track density 96TPI, track to track access time 3mSec. Plugs directly to BBC Micro. ONLY **£220**
- **SINGLE MITSUBISHI** Slimline – Cased with own PSU, DS/DD, 1 Megabytes. (400k with BBC) **£275**
- **TWIN MITSUBISHI** Slimline Cased with own PSU, DS/DD, 2 Megabytes. (800K with BBC) **£535**
- Single Drive Cable for BBC Micro **£7**
- Twin Drive Cable for BBC Micro **£10**
- **Dual SWITCHABLE DRIVES**, 40/80, 400K. Cased with own PSU, Slimline **£495**

5¼" DISKETTES

5 year warranty	
● 10 Verbatim or 3M Diskettes, 5¼", S/S	£20
● 10 Verbatim or 3M Diskettes, 5¼", D/S	£30
2 year warranty	
● 10 WABASH Diskettes, 5¼", S/S	£15
● 10 WABASH Diskettes, 5¼", D/S	£25
● Carriage on Drives	£7

PLASTIC LIBRARY CASES for Disc Storage 5¼" (holds 10) £2

BBC PRINTER GP100A

10" Tractor Feed, 80 columns, 30CPS Normal & Double width Char, Dot res graphics. Parallel Interface standard.

ONLY **£170** (£7 carr.)

INTERFACE CABLE

BBC to Seikosha Cable **£10.00**

DUST COVER for GP100 £3.95

FRICTION FEED

Attachment for GP100A or 250X **£22**

● Spare RIBBON for GP80	£4.50
● Spare RIBBON for GP100	£4.95
● Spare RIBBON for GP250	£5.95

SEIKOSHA GP-700

A 7 colour graphic printer at the price of a standard dot matrix printer. Its unique 4 hammer method enables text and high res graphics to be drawn in 7 basic colours or 30 shades. 7 x 8 matrix. Up to 106 char. per line at 50 CPS. Variable line spacing to 1/120". Tractor or Friction feed. Centronix interface standard.

ONLY £375 (£7 carr.)

GP-700 Colour Printer Screen-dump routine in ROM FOR BBC Micro **£12**

Epson RX80

100 CPS, 9 x 9 matrix, dot addressable graphics, condensed and double width printing. Normal, Italic and Elite Characters. Tractor feed, 10" max width, bi-directional, logic seeking. Centronics Interface standard.

ONLY £255 (£7 carr.)

RX80F/TPRINTER: As above but has both Friction and Tractor feed **£284**

Epson FX80

160 CPS, 11 x 9 matrix, proportional spacing, superscripts, subscripts, dot addressable graphics. Normal, Italic and Elite characters. Up to 256 user definable characters. Down loadable character set. Condensed and double width printing. Full proportional spacing. Four user defined margin positions. Tractor and Friction feed. 10" maximum width Bi-directional, logic seeking Centronics interface standard.

ONLY £369 (£7 carr.)

INTERFACES FOR RX & FX PRINTERS

RS232	£38.00
RS232 plus 2K Buffer	£75.00
IEEE 488	£70.00
Parallel 2K	£62.00

	Ribbons	Dust Covers
MX80FT	£4.75	£4.50
MX100	£10.00	£5.25
FX80	£4.75	£4.95
RX80	£4.75	£4.50

PRINTER INTERFACE BUFFER

When your system tries to serve you well but its efforts are frustrated by slow printers delaying from returning to more productive tasks then this is where our Printer Buffer Interface comes to your rescue. Available in 16K or 48K memory sizes. Simply connect the integral cables to your Micro and the Printer and switch on. The free standing compact unit (130x 135x40mm) is supplied complete with interface cables, a power supply and a comprehensive manual.

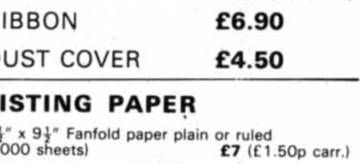
Price: (16K) **£120**

BROTHER 8300 DAISY WHEEL PRINTER/TYPEWRITER

Provides high quality type in six interchangeable styles. Ideal for business use. Friction feed; 11 cps; 12 inch max. width; 5 different colour ribbons; portable; hard top cover with carrying handle; connects directly to BBC Micro.

ONLY **£395** (£7 carr.)

NEC PC8023BE-C:



100 CPS, Bi-directional, logic seeking, 80 columns, 7x9 Dot Matrix head, true descenders on lower case, Superscript, subscript and underlining. Single sheet Friction or Tractor feed. Hi-resolution block graphics, 2K Buffer, etc. All this for only **£310** (£7 carr.)

RIBBON	**£6.90**
DUST COVER	**£4.50**

LISTING PAPER

8½" x 9½" Fanfold paper plain or ruled (1000 sheets) **£7** (£1.50p carr.)

15" Fanfold paper (1000 sheets) **£9** (£1.50p carr.)

Teleprinter Roll (econo paper) **£4** (£1.50p carr.)

PRINTER LEAD 36"

Ready made printer lead to interface BBC Micro to EPSON, SEIKOSHA, NEC, etc., Printers.

ONLY £10

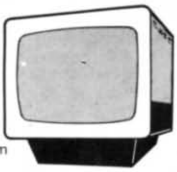
Special Extra long (60") Cable **£14**

BBC Micro WORD-PROCESSING PACKAGE

A complete word processing package consisting of: BBC Model B, Zenith 12" Green Monitor, Twin 200K highly reliable (1 year warranty) Twin Cased Disc Drives with own power supply, the popular WORDWISE word processor, Watford's own highly sophisticated 62 File DFS interface fitted, the world renowned Brother 8300 Daisy Wheel Printer/Typewriter, Gemini's Beebplot & Beebcalc Spreadsheet Analysis Software tapes, 10 blank diskettes, 500 sheets of Fan-Fold paper, Manuals and all the leads.
All you require is a mains power point to have it up and running (we even supply the 4 way mains socket).

ONLY **£1,350** (carr. £15)

MONITORS



MICROVITEC 1431
14" Colour Monitor, RGB Input. (as used in BBC programmes) FREE Interface Lead. **£249** (carr. £7)

- **KAGA RGB** 12" Medium Resolution Colour **£219** (Carr. £7)
- **KAGA RGB** 12" High Resolution Colour **£225** (carr. £7)
- **BNC** Connecting Lead **£3**
- **RGB** Connecting Lead **£5**

ZENITH 12" Green Monitor. Hi-resolution **£75** (£7 carr.)

CASSETTE RECORDER & ACCESSORIES

Top quality Slimline, portable Cassette Recorder for Computer use. Mains/Battery, operated with counter. **£24.00** (Carr. £1.50)

CASSETTE LEAD
For our Cassette Recorder to BBC Micro **£2.00**

CASSETTES C12 Computer grade in library cases **40p**

STACK PACK The unique Cassettes drawer rack system including 10 off C12 Computer Cassettes **£6**

ONE STOP SHOP

BEEB SPEECH SYNTHESISER

Watford Electronic's very own Speech System. Specially designed so that even a novice can make his BBC talk:-

SIMPLY the best! – An unlimited speech synthesis system. Complete with easy-to-follow manual. Controlling software is in ROM so no Cassette Loading problems!

PHONEMES for word synthesis – That means unlimited vocabulary! No extra speech dictionary chips to buy!

BUILT-in Library of approximately 500 words to get you started.

ENGLISH accent – Utilises inflexion techniques **to produce highly comprehensible speech.**

EASY to use system – Just plug the software ROM into a socket, the Speech unit into the User Port, and away you go! No specialised 'dealer upgrade' required!

COMPACT unit – The whole system is built into a small case – easily tucked behind the computer. Auxiliary output socket provided for direct connection to an external amplifier.

HOURS of fun! – Suitable for any application – Games, Educational Programs, Specialised Packages.

We know this all seems too good to be true but DON'T BE LEFT SPEECHLESS! Order your Versatile Speech Unit now!

Only £39

READY-MADE LEADS for BBC

CASSETTE LEADS 7 pin DIN Plug to 5 pin DIN Plug + 1 Jack Plug	**£2.00**
to 3 pin DIN Plug + 1 Jack Plug	**£2.00**
to 7 pin DIN Plug	**£2.50**
to 3 Jack Plugs	**£2.00**
6 pin DIN to 6 pin DIN Plug (RGB)	**£2.50**
Monitor Lead, BNC to PHONO	**£3.00**

Disc Drive to BBC Micro Power Lead
Single: **£3.00** Dual **£3.75**

MISCELLANEOUS CONNECTORS

	Plugs	*Sockets*
RGB (6 pin DIN)	**30p**	**45p**
RS423 (5 pin Domino)	**30p**	**40p**
Cassette (7 pin DIN)	**25p**	**65p**
ECONET (5 pin DIN)	**15p**	**25p**
Paddles (15 pin 'D')	**£1.10**	**£2.15**
Disc to BBC Power Plug 6 pin	**70p**	-
Disc Drive Power Plug 4 pin	**60p**	-

BEEBPLOTTER

The Unique Graphic Tablet

Watford Electronics' BEEBPLOTTER will work with 32K BBC Micro. Connects to Analogue port. The unique design makes it accurate and simple to use. Attractively finished. The comprehensive booklet supplied describes its use in detail and shows some of the possible applications.

The special features include:-

- Works in all graphics mode and any colour selectable.
- Commands printed on Tablet and On-screen instructions.
- Special routines enable pictures to be quickly loaded from tape.
- Works with all operating systems and ECONET. Tape and Disc versions available.
- Large drawing area (32cms x 23cms).
- Maps, Pictures and Diagrams produced quickly and easily.
- Transparent tablet enables maps and diagrams to be copied directly from books.
- Commands include line, circles and rectangle drawings, infilling, full editing and an easy to use copy and move feature.
- Screen dump routines included for Seikosha and EPSON printers.
- Routines are included to allow user to incorporate pictures in their own programs.
- Designed by a professional teacher with educational uses in mind.

ONLY **£80** (£3 carr.)

13 ROM SOCKET BOARD

Are you wondering where to fit new ROM based software inside your computer in addition to the BASIC, WORDPROCESSOR, DFS, and FORTH ROMS? Then our add-on 13 ROM Socket Board is the answer. Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 4 solder connections to be made. Full instructions are supplied.
Our 13 ROM SOCKETS BOARD enables the **User to increase the Sideways ROM capacity** the basic four sockets on the main board upto the full SIXTEEN capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)
The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.
All essential lines are buffered and the Board meets or exceeds all timings for operation in the BBC Microcomputer. When fully populated, the ROM Board consumes less than half the recommended maximum current limit.

Supplied ready-built and tested complete with fitting instructions.

ONLY **£29.95** (carr. £1)

EPROM for the BBC MICRO & 13 ROM SOCKET BOARD

	1+	25+
2764-250nS	**£ 4.20**	**£ 3.75**
27128-250nS	**£22**	**£18**
27128-400nS	**£16.00**	**£14.50**
8271	**£36.00**	

CMOS RAM for the 13 ROM SOCKET Board

6116-150nS (2K)	**£3.40**
6264-150nS (8K)	**£32.00**

EPROM PROGRAMMER for BBC MICRO

At last! – the EPROM Programmer for BBC Micro Computer from WATFORD ELECTRONICS that will suit both your pocket and all your requirements. Programs all popular types of EPROMS from 2K bytes up to 16K bytes – **2716 — 2516 — 2532 — 2564 — 2764 — 27128.**
This extremely powerful system is designed for your needs of TODAY & TOMORROW! – BBC Basic programs can be copied into EPROM and subsequently re-loaded faster than from a disc! Suitable for both hobbyist and professional users!

Just look at these features:

- **COMPLETELY SELF CONTAINED** – Housed in its own sturdy case – Uses its own Power Supply – Connects directly to the 1MHz Bus – Simple and Safe!
- **FULL SOFTWARE SUPPORT** – Comes complete with simple to use ROM based software – Facilities include Varification, Reading, Virgin Testing, Writing, Editing, Saving, Loading and more! NOTE!! – This software does NOT simply comprise hastily prepared routines to get you going, but is a professional, purpose designed applications package.
- **ACORN BUS COMPATIBLE** – Use of the 1MHz connection complies with all Acorn addressing recommendations – That means you can still add-on such things as the TELETEXT, IEEE 488 and PRESTEL Adaptors without having to disconnect everything.

You don't need just any Eprom Programmer – you need **WATFORD ELECTRONICS** EPROM PROGRAMMER System.

ONLY **£89** (£2 carr.)

(Price includes software in ROM and Manual)

BEEBMON

A ROM based machine code Monitor for the BBC Micro. It enables machine code programs to be debugged and altered easily and quickly. Being a ROM, its Commands are always readily available and occupy no USER memory.
The special features includes facilities like: TABULATE, MODIFY, FILL, COPY, COMPARE, SEARCH (Hex & ASCII), CHEKSUM, DISASSEMBLE, RE-LOCATE, SINGLE STOP, SET BREAK POINTS, SCREEN DUMP ROUTINE, DUMB TERMINAL and many more facilities.

£22

BBC LIGHT PEN KIT

All parts available as per Acorn User's 'SHINE A LIGHT' Light Pen article.

Kit Price: **£8.95**

BBC LIGHT PEN

A ready-made Light Pen for BBC Micro. Enables you to produce drawings on your own TV/MONITOR screen. Supplied complete with Software Cassette and instructions.

ONLY: £17

WATFORD ELECTRONICS

Continued →

★ NEW ★
BBC MICRO DFS

by Watford Electronics

Highly acclaimed at the Acorn User Show. What do the independent press say?

Good Value for Money – Beebug Aug. '83
A very worthwhile package – The Micro User Sept. '83

Without a doubt, the most sophisticated DFS Software yet written for BBC Micro Computer. This powerful new DFS is fully compatible with ACORN DFS yet has much increased power due to additions, carefully designed to make life easier in normal use. It consists of over 14K of efficiently written machine code. It is entirely self contained and so does not require a utilities disc to function.

- The system can either use the ACORN standard 31 files per disc side or DOUBLE THE CAPACITY to 62 files. The size is selected at formatting time. Copying between discs with different catalogue sizes works perfectly normally.
- A FORMATTING PROGRAM is built in, permitting formatting to 35,40,80 track formats with either 31 or 62 files. Since the formatter is built in to the DFS it can be used without affecting whatever program you are using.
- A DISC VARIFIER is also built in. This checks the internal checksums on each sector to identify any corrupted data. This is extremely useful when saving valuable data as it shows faulty discs quickly and easily. Again it does not affect the program you are using.
- A built in DISC SECTOR EDITOR gives a screen window onto the disc enabling detailed editing of any byte on the disc. This is very useful for recovering accidently deleted files and can save weeks of work.
- A double step mode allows the user of 80 TRACK DRIVES TO READ 40 TRACK DISCS. This mode is software selected for each drive individually, thus allowing a 40 track disc to be copied onto an 80 track one very easily. THIS ELIMINATES THE NEED FOR EXPENSIVE SWITCHABLE DRIVES.
- A WORKFILE function sets the name to be used when the null filename is issued. This allows a program to be edited and repeatedly saved having only typed its name once.
- When using LOAD, CHAIN, etc. it is possible to specify an ambiguous filename. This will result in the first file whose name matches the specification being used. This saves typing the end of a filename that you know is uniquely identified by its first few characters.
- Two commands exist to simplify the transfer of programs from TAPE TO DISC. These load the file to &1200, switch off the disc system and then move the file to its correct load address; thus saving a lot of complicated programming. This command can be used to load files up to 27K5 long.
- An advanced COPY command is included which will prompt the user, requesting whether to copy each file.
- RENAME has been extended to allow the use of ambiguous filenames. This allows you to change BERT1, BERT2, BERT3 to FRED1, FRED2, FRED3 with only one command.
- OPENOUT has been improved to give you fewer annoying 'Can't extend' errors, as it automatically picks the biggest space on the disc in which to put a file. A SPACE command lets you know how much space *COMPACT could create before you waste time doing it.
- 1.75K of RAM can be taken over from the DFS for your large BASIC programs while still retaining LOAD, SAVE and *CAT and other simple commands.
- Comprehensive and clearly written Manual (available separately) gives the user a complete package deal.

Price **DFS ROM** ONLY **£42**

Complete interface kit incl. DFS ROM **£85**

Comprehensive and clearly written DFS Manual (can be purchased only when you buy Watford's DFS) (No VAT) **£7.50**

P.S.
We will exchange your existing ACORN DFS or AMCOM (PACE) DFS for the highly superior Watford's DFS ROM for **£35**

ONLY THE BEST AT WATFORD

BBC FORTH on Cassette

Follows FORTH-79 standard and has fig-Forth facilities – Provides 260 FORTH words – infinitely extensible – Full screen editor – Allows full use of MOS – Permits use of all graphic modes, even 0-2 (just) – Easy recurtion – Runs faster than BBC BASIC. ONLY **£15** FREE 70 page manual and a Summary card.

BBC FORTH TOOLKIT

Adds following facilities to FORTH. 6502 Assembler, providing machine-code within FORTH – Turtle graphics enables easy to use colour graphics – Decompiler routines enables versatile examination of your compiled FORTH programs – Full double number set – An example FORTH program and graphics demonstration – Other useful routines – 64 page manual included FREE. ONLY **£13**

LOGO II

This language is very popular in American schools as it is an ideal educational program. It can graphically demonstrate the ideas of defined procedures, sub-routines, loops and even recursive programming. Gives excellent introduction to LOGO language for young and old alike.

£9.95

Computer Concept's Firmware

BEEB-CALC £33

A ROM based spreadsheet program, like wordwise this firmware is fast and simple to use – yet is a powerful spreadsheet analysis program, considerably better than the original 'calc' program – full floating point maths. Works in 40 or 80 column screen modes – variable column widths. Works with either cassette or disc. This ROM coupled with Wordwise can turn your micro into an ideal small business machine.

Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL OFFER: ONLY **£34**

DISASSEMBLER

Will generate fully labelled assembly listings of any machine code program. Data is automatically differentiated from code and displayed together with its ASCII equivalent. Assembly listing can be saved in *EXEC format and subsequently incorporated into user programs. In our opinion this is an excellent software at an incredibly low price.

Cassette: **£6.95**
Disk: **£8.95**

EMULATOR

An extremely powerful and flexible machine code interpreter. Allows you to write and debug machine code as easily as BASIC. Features single step, breakpoint register display, edit modes, etc.

Cassette: **7.25**
Disk: **£9.25**

VIEW

Acorn soft's Wordprocessor ROM.
The ultimate in Wordprocessing **£52**

ACCESS ORDERS BY TELEPHONE
Simply phone your order through. We do the rest
(0923) 50234

FORTH ROM for BBC

This superb (FIG FORTH) compiling language now available in ROM. Simply plugs into one of the ROM Sockets. Full FORTH manual included. **£39**

GEMINI'S BUSINESS SOFTWARE

Written by professional Chartered Accountants and coded by competent programmers. Ideal for small and medium sized companies. Now available from stock.

Cashbook Accounts	£52
Final Accounts	£52
Invoices & Statements	£17.25
Commercial Accounts	£17.25
Mailing List	£17.25
Database	£17.25
Stock Control	£17.25
Home Accounts	£17.25
Beebcalc Spreadsheet Analysis	£17.25
Beebplot	£17.25

N.B. All the above Gemini software is on tape. For Disc Based (40/80 track) please add £3.

BOOKS (No VAT on Books)

30 Programs – BBC Micro	£4.95
30 Hour BASIC (BBC Micro)	£6.00
6502 Application Book	£10.25
6502 Assembly Lang. Programming	£12.50
6502 Assembly Lang. Subroutines	£11.80
6502 Software Design	£10.50
A young persons guide to BBC Basic	£4.50
ACORN ATOM Magic Book	£5.50
Advanced 6502 Interfacing	£10.95
Assembly Lang. Programming for BBC	£8.95
Advanced Programming Techniques for the BBC Micro	£7.95
BBC Basic	£7.95
Assembly Lang. Prog. on BBC Micro	£7.40
BASIC Programming for BBC Micro	£5.95
BBC Forth	£7.50
BBC Lisp	£7.50
BBC Micro An Expert Guide	£7.50
BBC Micro Graphics and Sound	£6.95
BBC Micro ROM PAGING System Explained	£2.95
BBC Micro Revealed	£7.95
BBC Micro Instant Machine Code including Software Cassette	£34.00
Creative Adventure Programs on BBC Micro	£6.95
36 Challenging Games for the BBC Micro	£5.95
Creative Graphics Cassette (Acornsoft). Has 36 graphics programs	£8.95
Creative Graphics on BBC Micro	£7.50
Discover BBC Machine Code	£6.95
Discover FORTH – Osborne	£11.25
Easy Prog. for BBC Micro	£6.50
35 Educational Programs for BBC Micro	£6.95
Further Prog. for BBC Micro	£6.90
FORTH Programming (Sams)	£12.50
Functional forth for the BBC Computer	£5.95
Games on your BBC Micro	£2.95
Games BBC Computer can Play	£6.95
Getting Acquainted/Acorn ATOM	£7.95
Graphs & Charts on BBC Micro	£7.50
Intro to Micro Beginners Book (3 Ed.)	£9.90
Let your BBC teach you to program	£6.75
Micros in the Classroom	£4.90
Practical Prog. for BBC & ATOM	£5.95
Programming the 6502	£10.75
Programming the BBC Micro	£6.95
Logo Programming	£8.95
Mastering VISICALC (Sybex)	£11.95
Structured Prog. with BBC BASIC	£9.50
The BBC Micro Book, BASIC, SOUND & GRAPHICS	£7.40
The Complete Programmer	£5.95

NEW DISC-FIX ROM

This ROM is an integrated, menu-driven DISC MAINTENANCE PACKAGE. Using simple menu selections, with intelligible prompts for any input required, the user can recover data from damaged discs. Facilities include:-

- Full screen editing of sectors on the disc.
- Sectors can be found by file name or sector number.
- Files and sectors can quickly and easily be dumped to a printer for examination and possible subsequent modification.
- COPY: blocks of data can be copied from any point on the disc to any other point. Blocks can be as small as one byte and can be transferred anywhere in a sector.
- SEARCH: The disc can be searched for any string, starting and finishing at any designated sector.
- VERIFY: Any block of sectors can be checked for their validity.
- FORMAT: Any track or group of tracks can be individually formatted to Acorn or Watford DFS standard.
- INSERT: Allows the manual creation of new directory entries to allow "undeletion" of files.
- BACKUP: This is similar to normal DFS backup but allows recovery after a disc error.

Completely compatible with both Acorn and Watford Disc Filing Systems. Instruction manual supplied.

Price **£19.00**

TINY PASCAL (in 16K ROM)

PASCAL-T is capable of compiling source PASCAL into a compact very fast threaded-interpreters-code. Full editor and disc support are included. Comprehensive documentation supplied **£59**

EDUCATION Software

JUNIOR MATHS PACK (32K) £6.95
Makes learning fun for 5-11 year olds. This package consists of 3 programs (menu driven) that increase in difficulty as your child becomes competent. A very good supplement to standard educational methods.

MATHS TRANSLATIONS £5.50
This package explains how to translate Triangles and Quadrilaterals, moving these geometrical shapes on a grid. It goes step by step through the concepts and the matrix calculations involved. Excellent software.

WORLD GEOGRAPHY (32K) £7.00
Beautifully drawn Hi-Res colour map of the world illustrates and aids this graded series of tests on capital cities and populations of the world.

WORDHANG £7.80
(Age 7-13). A word guessing program based on the well known Hangman game. Uses full colour graphics. Complete with 260 words and the facility save your own list of words.

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Part seven of MIKE BIBBY'S introduction to programming

Ascii, and it shall be given unto thee

THERE'S lots of hands-on work this month, so make sure your micro is at the ready. To start off with, try running Program I.

```
10 REM *** PROGRAM I ***
20 MODE 6
30 PRINT CHR$(65)
40 PRINT CHR$(66)
50 PRINT CHR$(67)
```

Even if you don't fully understand what's going on, I bet you can still guess what

```
PRINT CHR$(68)
```

would give you!

CHR$ stands for "Character Strings" though I always read it as "Chris". So I would pronounce:

```
PRINT CHR$(65)
```

as "print Chris eighty-five".

The code number can be stored in a variable, so:

```
number%=65
PRINT CHR$(number%)
```

will work.

You see, every character you can put on the screen has its own code number. The code for A is 65, for B is 66 and so on.

CHR$( ) takes the code and turns it into a character string – that is, a string a single character long.

These numbers have been standardised in a table called, rather grandly, the American Standard Code for Information Interchange.

It's known as Ascii – pronounced "Askey" – for short. Page 490 of the User Guide lists the whole set.

If, however, like me you can never make head nor tail of tables of information, you'll be glad to know that you can use a Basic word called ASC( ) to tell you the number, or Ascii code, of the character you're interested in.

You just put the letter you want inside the brackets – in quotes of course, as we always do with strings.

For example, we ask the micro to print out the code for A with:

```
PRINT ASC("A")
```

which, if you remember to press Return (and I'm not going to remind you from now on!), will give you 65, the code for A.

ASC stands for Ascii, so read the example above as "PRINT Askey A".

Program II generates the Ascii codes for the characters you input.

```
   10 REM *** PROGRAM II ***
   20 MODE 6
   30 REPEAT
   40 INPUT "A letter",string$
   50 PRINT'"ASCII code for "string$"
is "ASC(string$)'
   60 UNTIL FALSE
```

Try inputting a string of more than one character and see what happens.

Program III shows the printable Ascii codes between 32 and 126. There are others, but for the moment we'll ignore them.

```
10 REM *** PROGRAM III ***
20 MODE 6
30 FOR loop%=32 TO 126
40 PRINT CHR$(loop%);
50 NEXT loop%
```

Notice the loop parameters in line 30. Remember, you don't have to start a FOR ... NEXT loop with the value 1. However, it's sometimes easier to visualise what's going on if the loop does start with 1, or perhaps zero.

For instance, Program IV prints out the whole alphabet in capitals!

```
10 REM *** PROGRAM IV ***
20 MODE 6
30 FOR loop%=65 TO 90
40 PRINT CHR$(loop%);
50 NEXT loop%
```

However, I prefer Program V, which performs the same task.

```
10 REM *** PROGRAM V ***
20 MODE 6
30 offset%=64
40 FOR loop%=1 TO 26
50 PRINT CHR$(offset%+loop%):
60 NEXT loop%
```

In which we go round in circles and meet some shady characters

What happens is that, since *offset%* is 64 throughout the loop, line 50 prints out the CHR$ of *loop%* plus 64.

For example,

for loop%=1, CHR$(65) is printed;

for loop%=2, CHR$(66) is printed and so on.

I admit there's a a bit of mathematical jiggery-pokery involved, but when I'm dealing with the alphabet the numbers 1 to 26 mean far more to me than 65 to 90.

Granted, there's one more line than in Program V, but it is far easier to alter the program if, say, I happen to get my figures wrong.

To demonstrate this, change line 30 to:

```
30 offset%=96
```

Hey Presto, lower case! The codes for the lower case alphabet lie from 97 to 122. Try altering Program IV to print out in lower case, and you'll see it involves much more work.

Of course, you could have had *offset%* =65 and *loop%* from 0 to 25, but that doesn't mean as much to me – I always think of the alphabet in terms of 26!

While we're on the subject of offsets, let's have a look at the challenge I issued last month – to alter line 40 of that month's Program III so that the numbers ran from 10 to 1 rather than from 1 to 10.

Program VI gives the answer.

```
10 REM *** PROGRAM VI ***
20 MODE 6
30 FOR loop%=1 TO 10
40 PRINT 11-loop%
50 NEXT loop%
```

What happens is that instead of just printing out the loop variable line 30 subtracts it from 11 first. So,

when loop%,=1, 10 is printed (11-10)

when loop% =2, 9 is printed (11-2)

and so on until

when loop% =10, 1 is printed (11-10)

Here we are using 11 as a sort of offset.

Try using this idea of taking the loop variable from a number to alter programs IV and V to print the alphabet in reverse, Z to A.

Before we leave Program VI, I must make the point that I would normally write line 40 as:

```
40 PRINT (11-loop%)
```

The brackets do not affect the outcome. They're used here simply as a "container" for the mathematics. I prefer this tidier approach, even if it's not strictly necessary.

Sometimes, however, the use of brackets is vital. For instance:

```
PRINT (8-2)*3
```

and:

```
PRINT 8-(2*3)
```

give totally different results. What happens is that the micro performs the sums inside the brackets first, then does the rest.

So in the first example the micro says to itself:

8 minus 2 is 6, multiplied by 3 gives 18

Whereas in the second it says:

2 multiplied by 3 is 6, subtracted from 8 leaves 2

So my amended line 40 tells the computer to do the sum first, then print the answer.

As I've said, in this case it's not strictly necessary, but such good habits may prevent you inadvertently dropping into error later.

Have a look at Program VII.

```
10 REM *** PROGRAM VII ***
20 MODE 6
30 FOR loop%=0 TO 10 STEP 2
40 PRINT 11-loop%
50 NEXT loop%
```

This prints out the numbers 0, 2, 4, 6, 8, 10. That is, we go from 0 to 10 in steps of 2.

Line 30 holds the secret. You see, we've assumed that in FOR . . . NEXT loops the loop variable – we've always used *loop%* – increases, or steps up by one, each time through the loop.

Actually we can tell the computer how much is added each time by tagging STEP onto the end of our previous FOR line.

In line 30 we have specified a STEP of 2, so 2 is added to the value of the loop variable each time.

Change line 30 to:

```
30 FOR loop%=1 TO 10 STEP 2
```

and you get 1, 3, 5, 7 and 9 printed out.

Notice that 10 is never printed – this is because when *loop%* is 9 and you come to NEXT *loop%*, you increase it by 2, obtaining 11.

This is outside the loop parameters, so you drop through the bottom of the loop – that is, the loop ends.

You can actually use the idea of STEP to *decrease* the loop variable – you just use a negative STEP.

Program VIII uses this technique to print out the numbers 10 down to 1, far more simply than in Program VI.

```
10 REM *** PROGRAM VIII ***
20 MODE 6
30 FOR loop%=10 TO 1 STEP -1
40 PRINT loop%
50 NEXT loop%
```

Notice that the loop parameters now go from 10 to 1. The larger number comes first, since we are decreasing the parameters each time. Adding –1 is equivalent to taking 1 away.

You don't even have to increase STEP by whole numbers. Try changing line 30 of Program VII to:

```
30 FOR loop%=10 TO 1 STEP 0.5
```

Now that we've covered the fundamentals of loops, we'll continue next month by using them in a variety of interesting ways.

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Spy can teach a thing or two

SPY is a monitor and disassembler for the BBC Micro and comes on an eprom which is easily inserted into one of the spare sideways ROM sockets inside the computer.

Once fitted it is instantly available to the user for inspecting, modifying, disassembling or debugging machine code programs.

Entered by typing *SPY, it can then be accessed from a running program by using breakpoints (BRK instructions), by typing CTRL-F or by OSBYTE call *FX 100. The disassembler can be entered without first entering SPY.

The designer of this aid obviously is, or was, a RML 380Z user, as the screen layout is similar, although better, than the RML front panel facility. The display is in mode 7 and uses colour skilfully for identifying the various important areas on the screen.

Once initiated, all normal machine and disc operating system commands are available via the * commands. One fault I noticed here was that the disassembler was entered with *LIST, a command already in the disc operating system. But more of this later.

The display includes the contents of all the 6502 registers, the contents of the memory addressed by the program counter and stack pointer and also the contents of a separate 64 byte block of memory.

The display can be in hexadecimal, Ascii or, for the memory block, in disassembled instructions.

All of the facilities that one would expect in a monitor are present, including the ability to shift, verify and fill areas of memory simply.

The eprom comes with a 15 page manual that is comprehensive and easy to understand. If this gets mislaid the Spy's Help pages can be accessed on the computer simply by typing *HELP SPY.

Also included is a memory map for Spy so that one knows the areas of memory that Spy uses for workspace. A very thoughtful addition!

To summarise, I have found this utility most useful, not only for the monitor, but for the instantly available disassembler that uses hardly any of the machine's RAM.

It is also useful as a self-teaching aid for 6502 assembler, as a piece of code can be single stepped through and its effect on memory, registers and status flags seen immediately.

It would make a very worthwhile addition to any machine code programmer's BBC Micro.

After I wrote this review I contacted Steve Swallow of System Ltd., who wrote Spy. He was most apologetic about the *LIST command which had already been pointed out to him by someone earlier. It had also been altered, and a new version was sent to me on return of the original. If only all software houses were as speedy!

The very latest version also allows the user to look at the contents of other sideways ROMs installed in the machine, which obviously enhances the package.

Paul Taylor

Control at your fingertips

A NEAT solution for those who want to be able to control mains powered devices but do not feel up to making the one described in the Bodybuilding course *(The Micro User,* August 1983), comes from SJ Research.

This device differs somewhat as it uses a mechanical relay. It consists of a box with a sloping front, with two mains sockets and LEDs, a flying lead with a mains plug and a small wire with a stereo jack plug.

The unit plugs into the mains and the devices to be controlled are plugged into the unit. They must not draw more than a total of 13 amps. The jack plug is connected to the user port of the BBC Micro via a short length of ribbon cable terminating in a cluster of four jack sockets resembling a milking machine.

The LEDs indicate when a socket is turned on and you can hear the click of the relay. The device worked well during testing and I experienced no difficulties setting it up.

The unit can be used with many different computers and will turn on the relay whenever a small voltage is presented to it.

Unfortunately this has the result of turning everything on whenever the BREAK key is pressed – the BREAK key initialises the user port to all inputs. The inputs then "float high" and thus activates the relay.

Under some circumstances this might be considered a safety hazard.

All in all, the unit is well constructed and at £29.95 represents reasonable value for money.

Mike Cook

A joystick to behold

TWO products that will be of interest to all games addicts – and those who wish to protect their keyboards from such addicts – have been produced by Voltmace.

The first is the Delta 14B handset costing £10.95, which consists of a good quality joystick and 14 push buttons.

This can be plugged into the analogue input port at the back of the Micro and is used like any other joystick. Several keys work as the fire button and you can choose the most comfortable. The joystick itself is spring loaded so that it is self-centring and has a good feel.

With the addition of the Delta 14b/1 adaptor box (£13.95) it is possible to use two joysticks and also to make the push buttons take the place of any keys on the keyboard.

To do this the adaptor box is connected to the user port and a software patch is loaded into the Micro which redirects the Basic INKEY function or its machine code equivalent.

As long as the writers of the game have stuck to the rules and not directly accessed the memory, this should work but it cannot be guaranteed in all cases. The 12 pages of instructions that accompany the handset system explain this fully.

A light coloured plastic grid fits around the keys and may be used for marking the functions for your favourite game.

Several readers have written to me enthusing over this system and after handling it myself I tend to agree with them.

Mike Cook

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Drawing with light

By MIKE COOK

ONE of the joys of a light pen is that it allows you to reverse the normal one-way traffic between the computer and display screen.

It can be used to input information into the computer from the screen, rather than the other way round. So it is particularly gratifying to be able to paint with a light pen using all the colours the BBC Micro has on offer.

This program will allow you to paint using the light pen described in the Body Building Course in the October issue of *The Micro User*.

It can also be modified to work with other light pens, as we shall see later, and it requires operating system 1.0 or 1.2.

As a light pen collects light for the computer to determine its position, we must paint on white paper (background).

We can select any colour of ink from the menu at the left hand side of the screen simply by pointing the pen at the white square to the left of the desired colour.

The colour currently being used is indicated by an asterisk.

Note that it is possible to select white, at the top of the menu, and also black, the last colour.

As well as selecting a colour you can choose either a fine or broad brush as well as a choice of textured brushes.

If you are adventurous you may even define your own brushes.

After selecting the colour and brush you can start to paint. As you move the pen over the screen you can almost feel the paint gush out.

It is very similar, I have been told, to painting with an air brush.

As the pen moves, the paint is dragged along with it so that slow movements will produce a continuous line and rapid movements will produce individual brush marks.

To get a single brush mark flick the pen at the screen as if trying to flick the ink out of it.

If you make a mess you can select white ink and use it as a rubber, and if your creation is totally beyond redemption you can resort to pressing the space bar to wipe it out.

If the ink fails to run, remove the pen from the screen briefly and try again, because sometimes when the pen is facing a bright open window it gets clogged with light.

To be really dramatic you can paint in flashing colours. They can be selected by holding down the shift key while the colour is being selected. However, if you have a weak stomach this is not recommended.

The operation of the program may need a little explanation for the curious, as you will get the best out of the light pen if you know what the program is doing.

The BBC Micro can detect the pen's position in terms of character position. This is not so useful for drawing as we want to be able to paint anywhere on the screen.

So instead the graphics cursor and text cursor are joined and their position is moved a fraction of the difference between where they currently are and the position of the light pen.

Thus the cursor position is dragged around in smaller increments than the pen itself could produce. This is done in lines 1130 and 1140.

The main loop of the program is in lines 270 and 330. This paints on the screen until the pen is pointing at one of the menu options or has remained still for a short time.

Before this is entered, lines 90 to 150 define the shape of the brushes, but these can be changed if you wish to experiment with different ones.

The procedure _PINT initialises the machine code routine used to read the light pen registers, and _PGET reads them.

The procedure _PDOWN waits until the pen is pointing at the screen and looks to see whether the space bar has been pressed (indicating a wish to wipe out the current painting).

For a more detailed explanation of how these procedures work see Page 65 of the October issue of *The Micro User*.

Some light pens do not have the special facility of detecting when they are pointing at the screen, so lines 750 and 760 will have to be changed if you have one of these.

Some pens have a built in switch that can be used for this, or one of the keyboard keys may be used.

The procedure _SELECT will change the brush or colour of ink. Lines 210 and 220 determine the brush and colour at the start of the program, which can be changed to your favourite brush/colour combination if you like.

The light pen paint brush takes some getting used to. Remember it is a brush and you should expect to produce bold textured strokes rather than fine lines.

Turn to Page 98 for full listing

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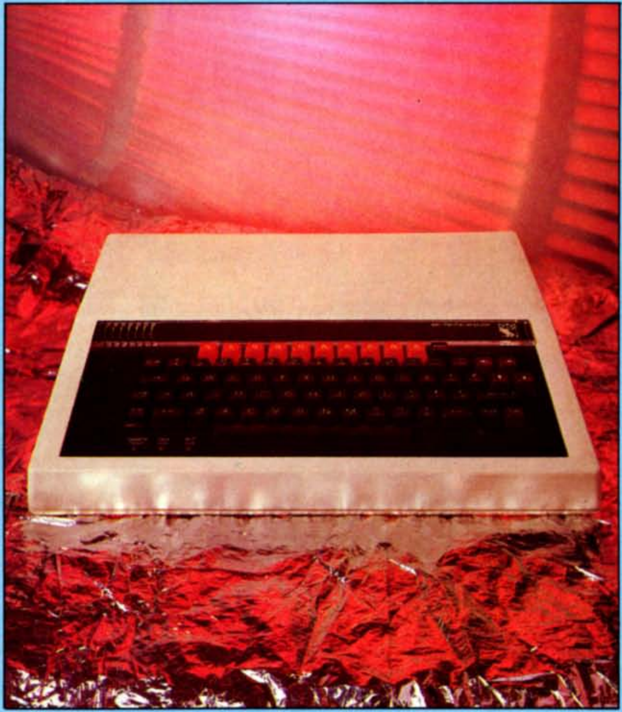

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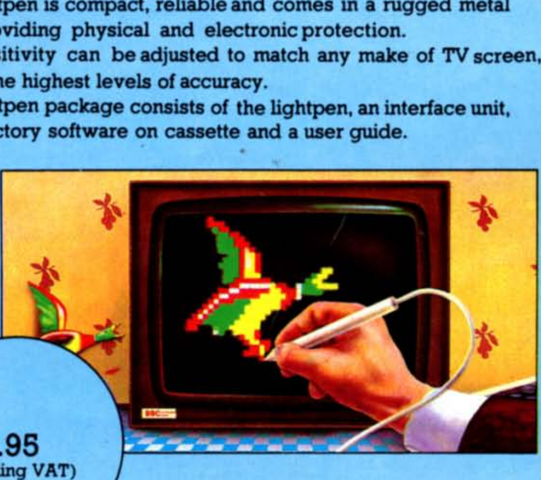

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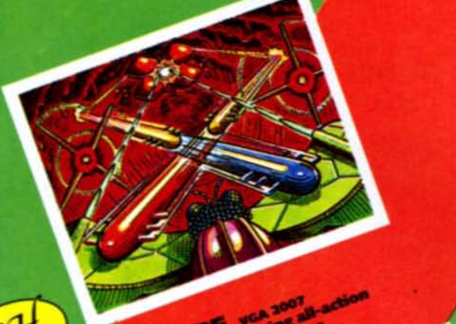

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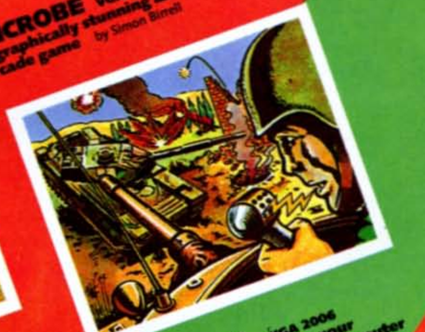

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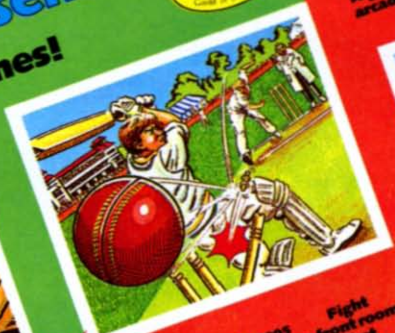

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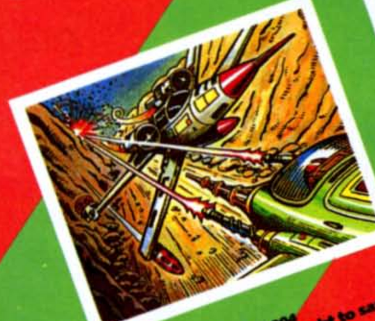

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The FORTH of FIRTH

By CHRIS MARTIN

FORTH is an easy language. It has very few reserved words and the bulk of the words available are there for you to use to do something. If you don't need to do it – you don't need to know it!

A word in Forth is the equivalent of a procedure or function in Basic like SIN or SQR or PRINT or READ. In Basic however, the arguments are passed to the function/procedure as a list following the word, sometimes in parentheses and sometimes not.

In Forth they are passed on the parameter stack which, in effect, means that they come before the function word.

For example, the Basic line:

```
X = 3 * 2
```

would become

```
3 2 * X !
```

(read "three" "two" "times" "X" "store")

rather like working on a Hewlett-Packard calculator.

Forth deals with text input and output in blocks of 1024 bytes and it is assumed that it has a disc to store them on. Program text is also stored in blocks of 1024 bytes, but these are ordered as 16 lines of 64 characters, and to differentiate them from ordinary text they are called screens instead of blocks.

OF THE 262 words in rqForth, a vocabulary of about 54 will keep you programming for a month or two.

Sound a lot? The list consists of:

7 action words – EDIT, LOAD, LIST etc.

9 input/output words – TYPE, SPACE, CR, KEY etc.

4 arithmetic – "+", "–", "" and "/" IF ELSE & THEN*

6 loop words – WHILE, DO, REPEAT etc.

2 base changing words – HEX and DECIMAL

6 tests – "<", ">", "=" etc.

4 logical words – AND, OR, NOT and XOR

2 definition words – VARIABLE and CONSTANT

start procedure and end procedure – ":" and ";"

5 stack manipulation words – SWAP, DUP, DROP etc – and finally

4 memory fetch/store words – "C@", "@", "C!" and "!".

Not too difficult, are they?

Standards

The interests of Forth have been looked after with tender loving care by enthusiasts for many years now. One of their concerns was a standard language where applications or utilities developed on one system could be transferred with the minimum of heartbreak to another.

The first standard was fig-Forth developed by the (American) Forth Interest Group (fig – geddit?) and this was followed by Forth-79 (issued in October 1980: even Forth, when it comes to standards, is no different from the rest) and a draft Forth-83 is circulating at the moment.

This standard effort has been going on since 1973 and now that the language is facing an explosion of popularity we are going to reap the benefits of interchangeable software.

Of course, machine dependent code will always be a stumbling block – but there's no answer to that.

What you get

The version of Forth supplied is standard Forth-79 with some words from the optional reference set, some from the (again optional) double-number set and some useful extra words like *MOS .S and CALL. It also contains a well designed screen editor.

The Forth words supplied do not allow floating point arithmetic and there are no graphics words, either. However, the word *MOS allows all the MOS commands to be sent (*SAVE, *LOAD, *TAPE etc) as in:

```
*MOS *SAVE "Forth" 0E00 3390
```

Further, all the VDU commands, such as PLOT, COLOUR and CLS, can be issued using EMIT, and the well designed CALL word (which makes provision for setting the A, X and Y registers before executing a JSR to the address supplied) allows OSWORD and all the OSBYTE (*FX) calls to be made.

This accounts for everything except floating point, addresses and calling

→

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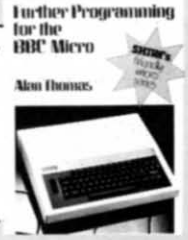
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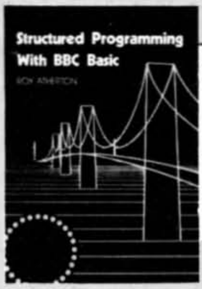
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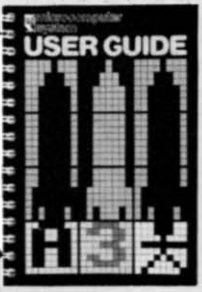

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sequences, and these have been published elsewhere.

rqForth comes on a cassette – a 300 baud copy on one side and two 1200 baud copies on the other – with a 72 page manual and a crib sheet with a summary of the instructions for loading, saving and editing on the front and 155 selected rqForth words on the back.

First impressions are very good. The printing is very clear, having been done by a typewriter (or similar) rather than the ubiquitous dot matrix printer.

The manual starts by introducing Forth and rqForth. The version supplied is not intended to work with discs (a proper disc version will be available later at a nominal change to existing owners) though instructions are included to run it on a disc machine – and they work.

The Forth screens and blocks are still available, however, but they are written to and read from a pseudo-disc area in memory. This gives the convenience of editing program screens but will not preserve the contents across a RESET or after switching off – this must be done by the user *SAVEing them to tape and *LOADing them again at the beginning of a new session.

The manual doesn't set out to teach Forth – it recommends "Starting Forth" by Leo Brodie of Forth Inc. After all, if the bookshop is full of dogs, why bark yourself?

There is a chapter on using rqForth, loading it, a sample session, saving the Forth dictionary and saving "disc" blocks on tape.

There is another chapter on the implementation details of rqForth, including a memory map allowing the user to apportion memory between the dictionary, the pseudo-disc blocks and the display area as required.

This allocation can be changed at any time, even from within Forth itself (as long as precautions are taken to save disc blocks first), and different versions can be saved on tape for reuse.

Half the manual is taken up by the glossary, which lists all the rqForth words with the stack parameters, attributes, description (use or action) and, if necessary, pronunciation (the pronunciation of "– – " is "next-block").

There are five appendices. The first gives the address of the UK and the USA figs. The second gives details on changing the memory map. It is set up for the BBC Model A as loaded, but can be shrunk to make more room or expanded to fill the Model B.

The FORTH of FIRTH

Appendix C gives notes to help the beginner working through "Starting Forth" to run the examples on rqForth.

The remaining appendices cover converting programs in fig-constants which may be altered and finally the complete source of the screen editor (to alter if you wish) and the source of some tape interface words which simplify saving dictionaries and disc blocks.

Using rqForth

The instructions for loading rqForth on a cassette or a disc worked first time. A Model B configuration was set up using the instructions given and this version (with 16 pseudo-disc blocks) was used in the review.

First, to see how fast it was compared to other micro Forths, I used the screen editor to enter Dick Pountain's PCW Forth benchmarks (Jan '83, p122) and saved them on tape.

The editor is a delight to use and compares favourably with the much more expensive xForth CP/M and Micromotion Apple II editors.

It uses the cursor keys to move about the screen and has control characters to insert a character at the cursor position, moving the rest of the line to the right, or to delete a character at the cursor position, moving the line to the left.

You can insert a line with all the following lines moving down, or delete one with the following lines moving up to take its place.

There are two scratchpad lines and by copying a line to the top scratchpad, interchanging scratchpads and copying a second line, two lines may be moved to any other place on this screen or any other, before or after the current one.

Having got used to the Micromotion Forth editor, I missed the ability to split and join lines – and its line stack on to which lines may be pushed to be pulled back again at some other place in the source.

I found this very useful to transfer a word definition to another screen to make room for some extra code, but it is a bit tedious, two lines at a time. However, the source is there and you can refashion it in your own image and likeness if you wish.

The standard screen size for Forth is 16 lines of 64 characters and this won't fit on a Model A display mode so (to use Mode 7) rqForth screens are 16 lines by 32 characters.

I must say I've found it hard to fit code on to the standard 16 x 64 screen (and that usually means that the comments are the first to go) as tradition rules that words should not spill over

The editor is a delight to use and compares favourably with the more expensive xForth CP/M

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into the following screen but the 32 character line makes this even more difficult to observe.

This is not a criticism of rqForth – it seems a good choice given the circumstances – but a criticism of the standard. Perhaps it will change.

Benchmarks

Comparing benchmarks it seems that rqForth is on a par with 4mHz Z80 Forth, though for dictionary searching 6502 Forth take about half the Z80 times – it must be that indirect indexed addressing mode!

Another benchmark was tried and took roughly half as long as the 1mHz 6502 Forth (the BBC uses a 2mHz chip). In a comparison between Basic and Forth on the BBC machine using a Forth version of the Basic program Basic took about 82 seconds and rqForth less than 12 seconds.

The dirt

On a clean surface even the slightest specks stand out. The documentation is excellent, the information is clear and easy to find.

I have only been able to spot two printing errors (or rather one printing and one non-printing error). On p.56 the word X and "[" (left-bracket) haven't come out and on p.66 the semicolons following :TAB and :%SWAP have got what seems to be a spurious apostrophe tacked on which might mislead a newcomer to the language.

In the editor, the CR (carriage-return character) is used both to return to the beginning of the line (when not there already) and to go to the beginning of the next line (when already at the beginning). I found that I had typed three lines on top of one another once – I was more careful after that.

There also seems to be a minor bug in the editor in that the white block at the end of the last line of a screen seems to move two characters to the left when going to and from screens, losing the last two characters of the screen. This is easily evaded by not using these two characters – not much of an imposition.

I was very pleased to find that if the system hung (I still do stupid things only realising it afterwards) it can be restarted (intact) by BREAK OLD RUN and W (for warm start).

Conclusions

This is a thoroughly professional system. It is well up to the standards of the best Forth systems (xForth and Micromotion). Its restrictions seem to be forced design decisions due to the limited memory space on the Model A (and even the Model B in the hi-res display modes). For your £15 you will get an excellent program development system.

Source:

rqForth version 0.4 by R.Q. Firth from Level 9 Computing, 229 Hughenden Road, High Wycombe, Bucks. HP13 5PG.

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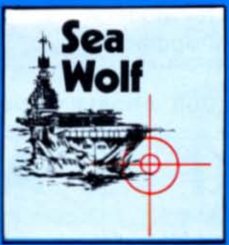

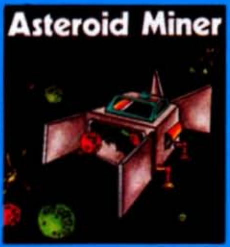

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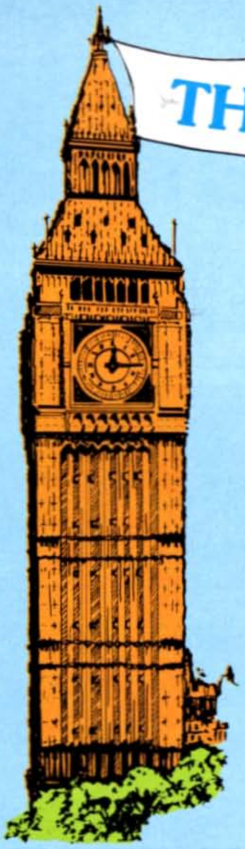

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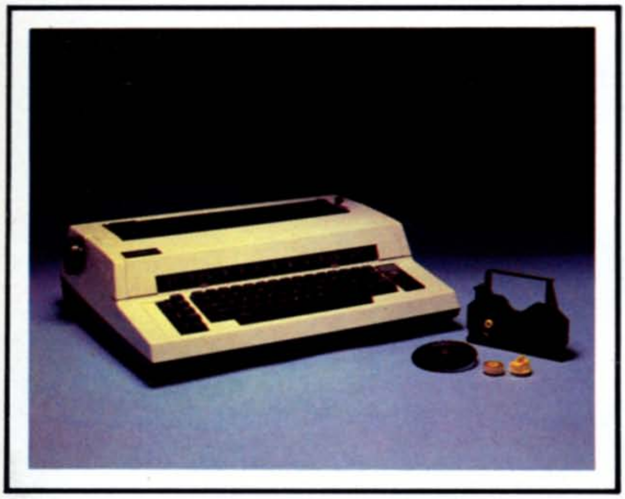

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Grab a stake in this super gambling game

BLACKJACK

By ANDREW PHILLIPS

IF you've ever fancied the idea of being a professional gambler but lacked the capital, this program should appeal.

Not only does Blackjack provide an accurate simulation of the well-known card game, but it also saves you the embarrassment of dropping the cards on the floor when you try to shuffle them.

The game couldn't be simpler. Each player must try to draw cards totalling 21 or as near that as possible, but without exceeding that total.

The program starts by asking the name of each player (eight letters only) and gives a credit of £10.

The computer then shuffles the cards and asks each player in turn for his stake. Once the bets are laid, the players and the bank are each dealt two cards, the bank's second card lying face down.

You are then asked if you want another card, and if you want to double your stake. You continue in this manner until you stick or bust.

When both players are through, the bank's second card is revealed and it plays its hand.

If you lose all your money, the bank will offer you credit – but not indefinitely. The game ends when a player reaches £100 or when the bank refuses further credit.

The formal rules of play are:

Two "packs" of cards are shuffled at the start of the game and at intervals during the game. (The players are informed when this occurs.)

Each hand may have up to five cards.

The bank will draw cards until they total more than 16.

A hand totalling more than 21 loses – "BUST". Blackjack (21 with two cards) beats all hands except another Blackjack.

Depending on the result of a round, a player's credit is increased or reduced by the amount of his stake.

A win with Blackjack increases a player's credit by twice his stake.

If a player's hand equals the bank's hand then the player keeps his stake ("HOLD STAKE") and his credit remains unchanged.

Provided that he has sufficient credit, a player may double his stake when drawing a card.

An ace is automatically given the value of one or 11 depending on the total of the hand.

Each player starts the game with a credit of £10.

If a player's credit reaches zero the bank will lend him a further £5 (and will automatically recover this when the player's credit permits).

The game ends when a player reaches £100 or when the bank refuses further credit.

For those who like to adapt programs, the procedures used in the program are listed. Figure I shows their interrelationship.

→

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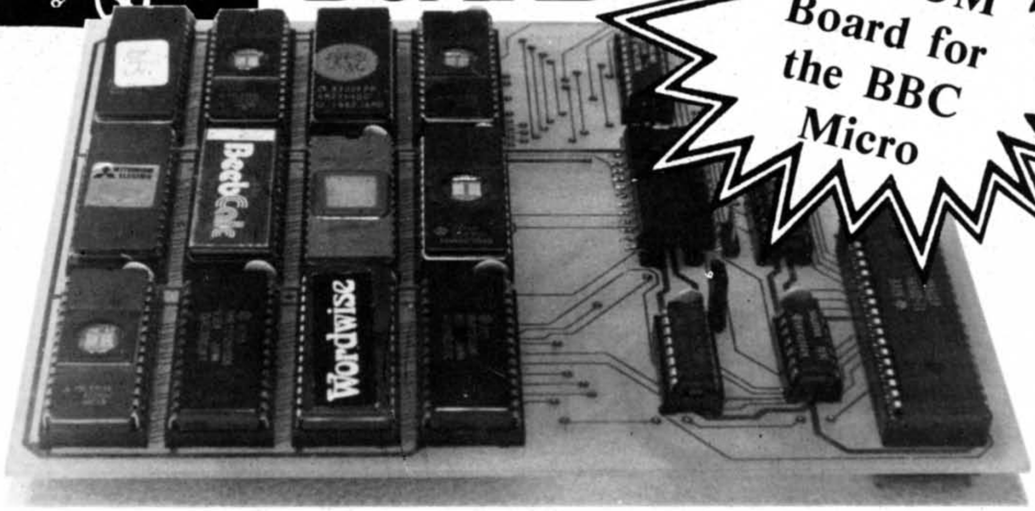

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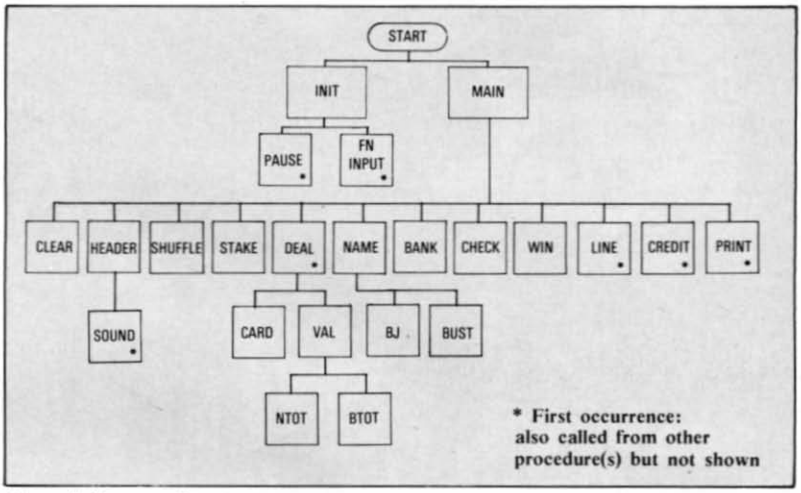
From Page 47

List of procedures

130 **PROCinit** defines variables, special characters and envelopes.
500 **PROCmain** controls main program logic.
830 **PROCshuffle** "shuffles" cards (that is, sets up values for 104 cards by randomly arranging integers 1-13 in array) and prints message.
950 **PROCheader** prints headings and, where appropriate, players' debts.
1120 **PROCcredit** shows state of players' credit.
1170 **PROCstake** prompts and checks input of stake and displays amount.
1290 **PROCdeal** controls the dealing of cards.
1390 **PROCname** controls sequence of play in dealing each player's hand.
1720 **PROCbj** produces message and sound and updates player's credit for "Blackjack".
1790 **PROCbust** as above, for "Bust".
1860 **PROCbank** controls dealing of Bank's hand. Produces message and sound for "Blackjack" or "Bust".
1990 **PROCcheck** for each player, checks for winning and losing hands and sets up message.
2110 **PROCwin** sets up and prints message at end of round.
2230 **PROCline** centres and prints message line.
2280 **PROCpause** uses INKEY to provide pauses during play.
2310 **PROCcard** draws a card.
2390 **PROCval** prints card values and graphics, calls totals procedure.
2550 **PROCsound** produces appropriate sound or tune to accompany message.
2740 **PROCNtotal** sets value of ace as one or 11 when required. Updates and prints total value of player's cards.
2820 **PROCBtotal** as above, for bank.
3070 **PROCprint** prints text for headings.
3100 **PROCclear** sets flags and clears variables at start of each round.
2890 **FNinput** used in PROCinit and PROCstake to control length and type of input.



*** First occurrence: also called from other procedure(s) but not shown**

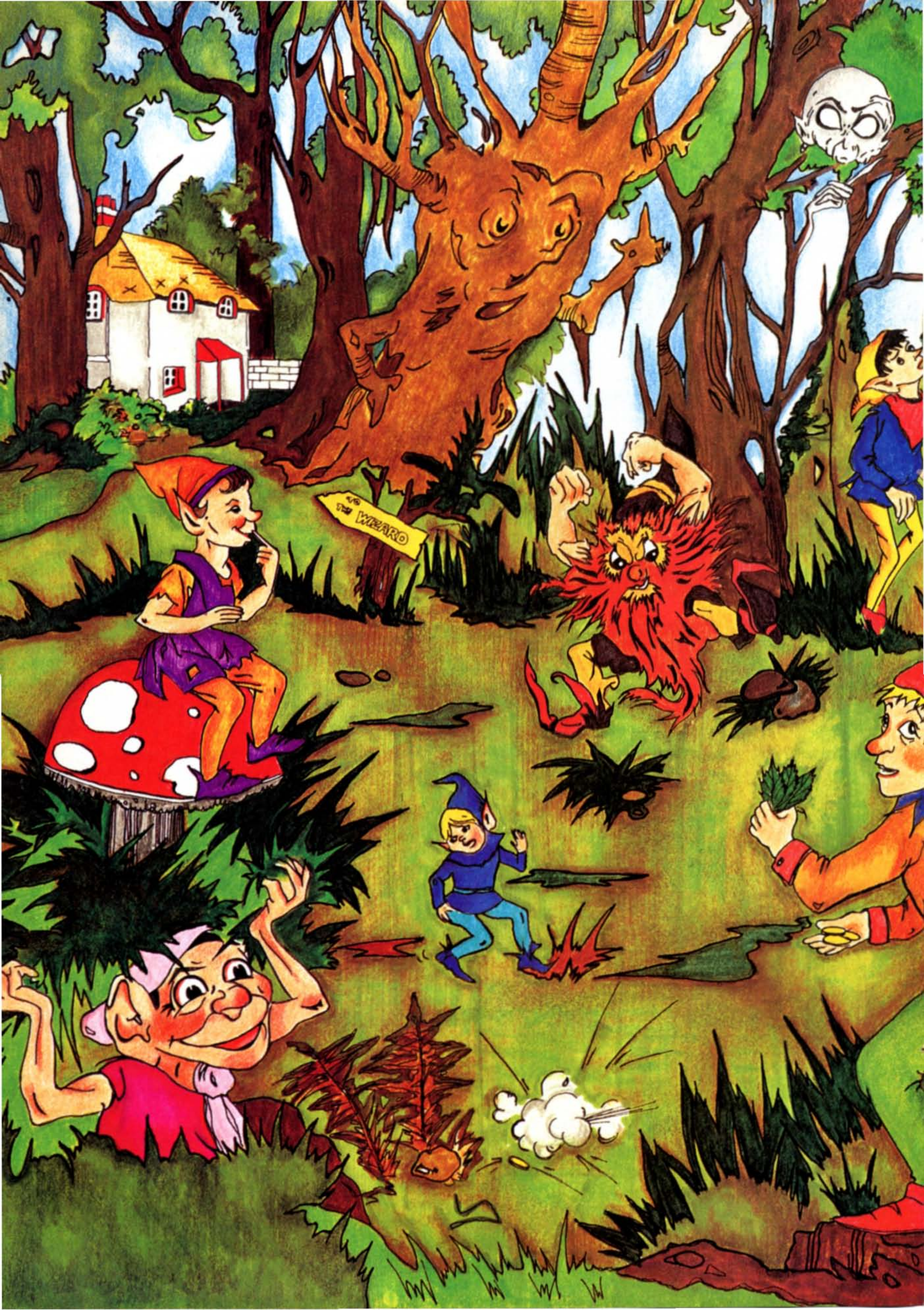
Figure I: Program Structure

Blackjack listing

```
 10 REM
    :"BLACKJACK"
 20 REM
    :By A.Phillips (1983)
 30 REM
    :BBC 32K
 40 ON ERROR GOTO 90
 50 MODE 7
 60 PROCinit
 70 MODE 5
 80 PROCmain
    :MODE 7
    :GOTO 100
 90 IF ERR <>17 MODE 7
    :REPORT
    :PRINT " at line ":ERL
    ELSE RUN
100 *FX11,50
110 *FX4,0
120 END
130 DEF PROCinit
140 DIM A%(104),ST%(104),ST$(4)
    ,Ncards%(2),Ntotal%(2),Nscore%(2)
    ,NAflag%(2),NBust%(2),Stake%(2)
    ,Equal%(2),Pflag%(2),Name$(2)
    ,Buy%(2),Owe%(2)
150 VDU 23;10,32;0;0;0;
160 VDU 23,230,8,26,26,31,15,15
    ,31,63
170 VDU 23,231,16,216,216,248,248
    ,240,240,48
180 VDU 23,232,127,255,255,255,255
    ,239,207,7
190 VDU 23,233,32,240,248,192,192
    ,0,224,240
200 Q$=CHR$ 230+CHR$ 231+CHR$ 10+
    CHR$ 8+CHR$ 8+CHR$ 232+CHR$ 233
210 VDU 23,234,1,1,221,221,221,255
    ,127,63
220 VDU 23,235,128,128,187,187,187
    ,255,254,252
230 VDU 23,236,61,124,127,62,62
    ,59,24,15
240 VDU 23,237,188,62,254,124,124
    ,220,24,240
250 K$=CHR$ 234+CHR$ 235+CHR$ 10+
    CHR$ 8+CHR$ 8+CHR$ 236+CHR$ 237
260 VDU 23,240,8,28,28,107,127,107
    ,8,28
270 VDU 23,241,8,28,62,127,62,28
    ,8,0
280 VDU 23,242,54,127,127,127,62
    ,28,8,0
290 VDU 23,243,8,28,62,127,127,127
    ,28,62
300 VDU 23,244,153,153,153,255,66
    ,60,0,0
310 VDU 23,245,0,8,4,6,63,6,4,8
320 ST$(1)=CHR$ 18+CHR$ 0+CHR$ 0+
    CHR$ 240
330 ST$(2)=CHR$ 18+CHR$ 0+CHR$ 2+
    CHR$ 241
340 ST$(3)=CHR$ 18+CHR$ 0+CHR$ 2+
    CHR$ 242
350 ST$(4)=CHR$ 18+CHR$ 0+CHR$ 0+
    CHR$ 243
360 AR$=CHR$ 17+CHR$ 2+CHR$ 245
370 ENVELOPE 1,1,10,20,-30,10,5
    ,15,127,-2,0,-1,127,100
380 ENVELOPE 2,3,0,0,0,0,0,0,121
    ,-10,-5,-2,120,120
390 ENVELOPE 3,25,16,12,8,2,1,1
    ,10,-10,0,-10,200,100
400 *FX 11,0
410 *FX 4,1
420 FOR I%=10TO 11
    :PRINT TAB(9,I%);CHR$ 132;
```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

→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GOBLINS!

Guide Kaplan to the wizard's house and help the Pixies to banish these forest invaders

GOBLINS have taken over the forest and are terrorising the Pixie folk who live there. The Pixies' only hope of ridding themselves of the invaders lies with the wizard who lives on the far side of the forest.

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So Kaplan, bravest Pixie of them all, volunteers to make the hazardous

→

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KILLER GORILLA *"A superb piece of programming" (Laserbug) "One of the most successful BBC games ever". (PopCompWkly)* The very best of all the monkeys wandering around playing with your Beeb. Rescue the maiden crying 'HELP!'. Avoid rolling barrels, fireballs, iron beams. 4 screens on each level. Hi-score so far: 68,200. JOYSTIX O.K. (ProgramPower) £7.95

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From Page 51

journey across the forest to rope in the wizard's assistance.

And your job is to guide him through the trees to the wizard's house, avoiding the pursuing goblins.

The Pixies have provided Kaplan with their strongest spells.

He has five magic leaves which he can use to remove bushes that block his path and a store of magic coins to drop in the goblins' path. Should a goblin be foolish enough to tread on one he immediately disappears, providing Kaplan with a score of 100.

For those who are more inclined to try for a high score rather than just save the woodland folk, a few hints on tactics may be useful.

On the first level there are only two goblins, which are usually very easy to avoid. Thus it is in Kaplan's interest to get home with maximum bonus.

The best way to score is to complete levels, as the bonus increases rapidly and more coins are gained. Leaves should only be used in emergencies, for it is very frustrating to find oneself faced with a chain of bushes, impassable without a leaf.

In this situation there are two alternatives – allow Kaplan to be caught and save your coins for the next level, in the hope it will be easier, or use all your remaining coins to get more goblins.

This tactic is in effect an admission of defeat. If this happens to be your third attempt (no more lives), it is the only way to get more points.

Leaves and coins are useful, but above all it is essential to look at the whole plan and work out a route as early as possible.

To have skilfully avoided several goblins only to find yourself in a dead end is pointless, and can usually be avoided by using the few seconds allowed between subsequent moves of the goblins.

Time is expensive in terms of bonus but mistakes can lose the whole game. These tactics are merely suggestions and no doubt with practice you will work out better ones.

Here's a summary of the program:

Initially Mode 7 is used for the titles and rules, followed by a loop which will keep repeating the program unless N – the exit key – is pressed when the score sheet is displayed.

Mode 2 is used within this loop for the whole game. The bushes are printed and then the printing is moved to the graphics cursor for the central loop which moves both the goblins and Kaplan, while updating the score.

By
KIM WEST and
PAUL PASSANT

This loop continues until one of three things happens. If Kaplan is caught he returns to the beginning of the same level with one less life, or if it was his third go he is replaced by the score card.

Secondly, if he reaches home the bonus is increased and the next level is reached.

Thirdly, if the bonus is reduced to zero or less, a life is lost – similar to being caught.

Kaplan is moved by the first five PROCs.

PROCpixie checks for all relevent inputs, such as direction and coins. If an input is returned before the time is up one of the four direction PROCs is used. These are all similar in structure and only differ in that they change A% and B% (Kaplan's coordinates) by different amounts. PROCmanleft uses PROCclear to remove Kaplan from his old position and then checks to see if a coin should be placed where he was. If there is a clear space in front of him Kaplan will move.

The goblins have a rather more complicated set of PROCs. To help understand PROCgoblin it is probably worth looking at PROCscreen.

This sets up the bushes in random order and clears two patches around the cave and Kaplan.

It also prints the score, but the interesting part is the FOR-NEXT loop for N% which places goblins on clear spaces on the screen and then puts numbers related to its position in memory (line 1580).

x%+N% is the location of the value related to the goblins X coordinate (X%) and y%+N% to his Y coordinate (Y%). These values cannot be greater than &FF, so X% and Y% must be reduced (the range of both is over 1000).

Now one has a vague idea of what x% and y% are, PROCgoblin and its related PROCs may be easier to follow. Initially X% and Y% are found by reversing the process in PROCscreen.

As there are a possible 20 goblins, several of the memory locations will be clear. If one of these is encountered a delay is allowed to give some extra thinking time.

If a coin is encountered x% will have been set to 250. If this is found PROCflash is used to spirit away the goblin.

V% and W% are the difference in the X and Y coordinates of the goblin and Kaplan. They are used to select the correct direction of motion for the goblin.

If a goblin is on a diagonal from Kaplan it will try to reduce the biggest difference (of X or Y coordinates), but if it encounters a bush it will try to go in the next best direction.

The directional PROCs do two things, move the goblin and check to see if they have hit a bush, in which case PROCexplode kills them.

PROCdefine is the usual setter of variables and definer of characters.

There are also four envelopes for realistic magical noises. While this is being done PROCintro is setting the scene.

Lines 2010 to 2060 may look confusing, but they give a good effect at the beginning of the game. Try it!

The other PROCs are really self explanatory except in the case of PROCshiftbush, which uses h% to check which way Kaplan is moving and then clears the square in front of him.

The game starts off fairly simply but things soon hot up. If you get over 3,000 you are a grandmaster.

Complete listing starts on Page 111

The best thing nex

BBC microcomputer
BREAK
RETURN
SHIFT
DELETE
COPY
TORCH

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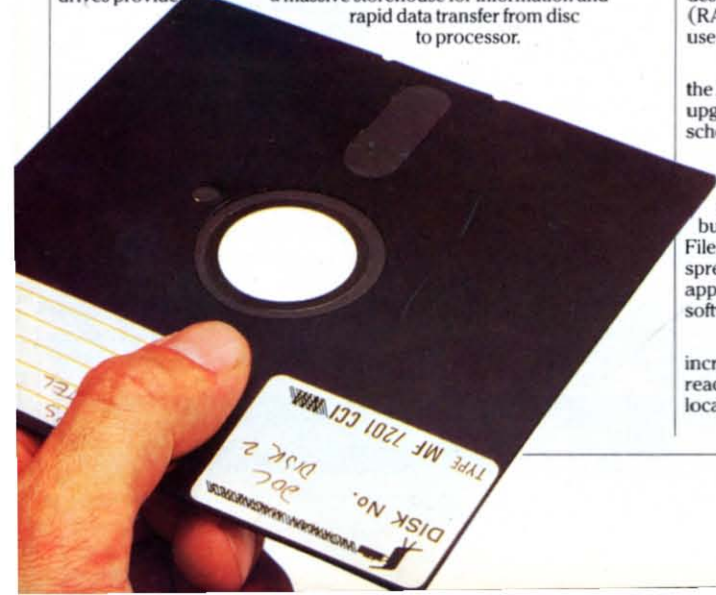

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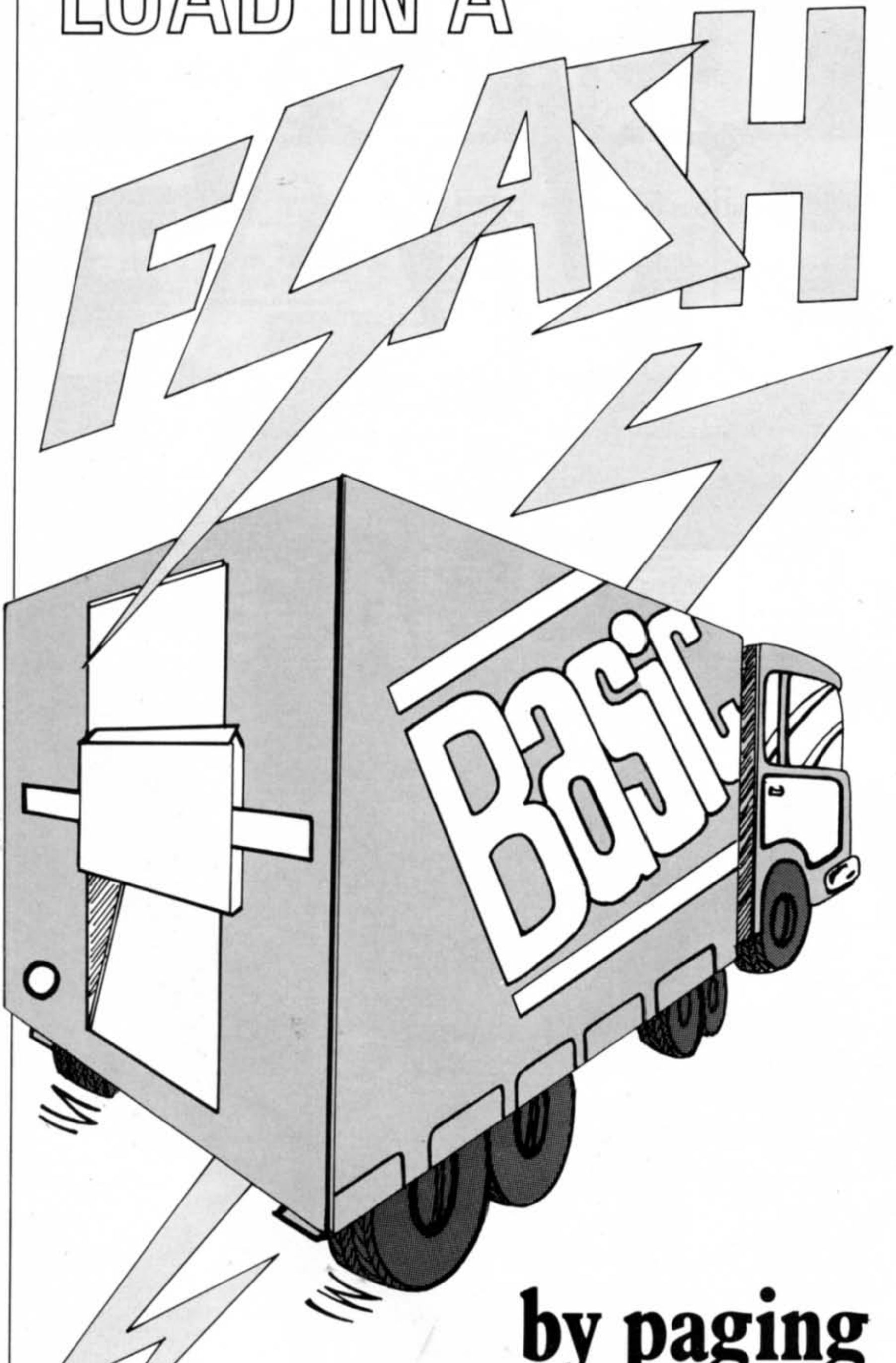
LOAD IN A FLASH



by paging your ROMs in the BBC Micro

THIS article looks at one method of loading a Basic program into RAM from an eprom located in a paged ROM socket.

This has the advantage over cassettes of virtually instantaneous loading and is suited to regularly used applications programs where a disc drive cannot be justified. The program is loaded into the Basic program area by typing in a "star" command of the user's choosing.

Most of us must be aware by now of the existence of "paged" or "sideways" ROMs in the BBC Micro. This is the facility which allows several 16k ROMs to occupy the same 16k section in memory (&8000 – &BFFF), the actual device used at any moment being software selectable.

The pinout of a typical 16k ROM is shown in Figure I. Each paged ROM is fed in parallel with address information (A0 – A12) and the paged ROM's data outputs are fed in parallel to the data bus.

Obviously if more than one ROM attempts to place a byte on the data bus at the same time, and those two bytes are different, the two ROMs will fight each other – one trying to pull a particular data line low while the other attempts to pull it high.

This will most likely result in the early retirement of one or both devices.

Pin 20 solves this problem. CE stands for "chip enable" and the bar above it means that the chip is enabled when pin 20 is low and disabled when pin 20 is high.

What does this mean in practice? In its enabled mode (pin 20 low), application of an address to A0 – A12 will result in the relevant data byte being placed on the data bus.

However, in its disabled mode the device does not output data. Instead, its data output pins are "floated". This means they will follow the levels on the data bus and make no attempt to change them.

As a bonus, in its disabled mode the device's power consumption drops by (typically) 75 per cent.

In the BBC Micro writing a number in the range 0 – 15 to location &FE30 will choose which of the 16 ROMs is enabled when a read is requested from a location in the range &8000 – &BFFF.

Only positions 0 to 3 have sockets on the main board. However, expansion boards are available to allow use to be made of the full complement of 16 positions.

The format at the start of the paged ROM must conform to certain criteria otherwise it will be ignored or misunderstood by the operating system.

The first section of code will take the form shown in Figure II. Here is a quick explanation of some of the main points:

JMP (Language): A jump to the start of the language code, for example Basic interpreter.

JMP (Service): A jump to code which will deal with various services offered by the operating system.

Type of ROM: A byte indicating what the ROM is capable of, for example &42=Language, &82=Service, &C2=Both.

Pointer to (C): A byte giving the offset from the start of the ROM to the 00 preceding (C).

When the eprom is blown it will contain three distinct sections.

Firstly, &8000 – &802F will contain the necessary format information as already discussed.

Secondly, &8030 – &81FF will contain the program loader and the command detection routine.

The command detection routine (created by lines 640 to 940 of the program) is concerned with ensuring that the eprom only responds to the correct star command.

The program loader (created by lines 1000 to 1390 of the program) is a machine code program which transfers the Basic program a byte at a time from the eprom to the Basic program area in RAM.

Thirdly the area &8200 onwards will contain the Basic program to be downloaded. This means that a 2764 eprom can download a Basic program up to 7.5k in length while a 27128 can cope with a Basic program up to 15.5k long.

This should be adequate for most purposes envisaged. However, more space could be left for the Basic program by compacting the first two sections if the individual so desired.

When the program is run the header is printed to the screen and protected using a VDU28 command. Line 190 prints a message to the user and lines 200 and 210 set up function keys 0 and 1 respectively with command mode instructions.

The program is exited in line 220, the user having been invited to "Prepare Basic program and press function key 0 when ready".

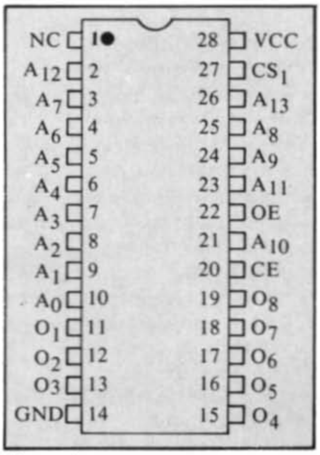


Figure I

LENGTH		OFFSET FROM START OF ROM
3	JMP (language)	0
3	JMP (service)	3
1	Type of ROM	6
1	Pounter to (C)	7
1	Version number	8
TL	ROM name	9
1	&00	9+TL
1	&28	10+TL
1	&43	11+TL
1	&29	12+TL
CL	Copyright Text	13+TL

Figure II

Pressing function key 0 sets page to &3200 and prints the message: "Now load required Basic program:- press function key 1 when completed."

The user should at this point load from cassette or disc the Basic program he/she wishes to install in the eprom. Pressing function key 1 sets L% to the length of the program just loaded and resets page to its previous value. The main Basic program is then re-entered at line 230.

Next the user is asked for the name of the eprom, the author's name and the command the eprom is to respond to (this should be typed in without the star).

By DAVID ALEXANDER

The eprom title and the command are limited to 10 characters by the program while the author's name is limited to 15 characters. Line 360 sets up a loop for the two passes necessary for the assembler sections which follow.

Included in this loop are some POKEs of values and strings into memory using Basic indirection operators.

These do not have to be in the two pass loop but have been left in so that wherever possible code is created in the same order as it will appear in the finished eprom.

Line 390 sets the language jump to 00s as our eprom is not capable of supporting a language. The service jump is set to &8030, showing where the start of our code for dealing with operating system offers is located.

We then leave the assembler to place various bytes and strings into the code using indirection operators. Line 470 sets the ROM type to service (&82) and line 480 sets the offset between the start of the eprom (&8000) and the 00 preceding (C). This will vary depending on the length of the eprom title.

Lines 490 to 550 are remarked adequately in the program. Lines 640 to 1390 form the machine code program which will detect the appropriate star command and transfer the basic program into RAM.

When the operating system incurs a star command which it does not recognise it passes it round the service paged ROMs to see if any of them recognise it.

It does this by entering the paged ROM at &8003 (that is, at the position of the service jump) with registers A=&04, X=ROM number and Y containing an offset which combined with the address stored in &F2 and &F3 points to the star command which the operating system is offering the paged ROM.

The first thing our code does is to check that register A=&04. If not it returns to the operating system.

If A=&04, the code saves the original values of A, X and Y and checks the command offered against

→

From Page 57

that which it will respond to.

The number of comparisons will depend on the length of the command which the eprom responds to, and that is the reason for the loop lines 830 to 900.

This loop places the section of code into the finished eprom the same number of times as there are characters in the command. The comparisons are all comparing with 00.

The correct values will be placed in the code later on and it is to ensure that they are placed in the correct position that the marker R% is set to the position of the first dummy 00 (line 820).

If during the comparisons any characters do not match, the original values of A, X and Y are restored and an RTS to the operating system is executed.

If all comparisons match – the call is the one to which the eprom responds – then the code prepares to transfer the Basic program into RAM.

The HI byte of Page is loaded from &18 and the source and destination base addresses are then set up in lines 1000 to 1060. The transfer uses indexed indirect (post indexed) addressing.

The main transfer loop is created by lines 1160 to 1230. This deals with the transfer of all the program except the last fraction of a page (1/4k).

When line 1170 detects the last 1/4k it jumps to LASTLOOP. This is similar to MAINLOOP except that line 1340 is looking for the transfer to have been completed (that is, when the program length LO byte is reached).

When this has occurred "OLD" and "RUN" are inserted in the keyboard buffer so that (a) Top will be reset and (b) the program will run automatically.

The values of X and Y are reset to their original values, but A is set to 00 to let the operating system know that the call has been serviced.

Lines 1760 to 1830 use indirection operators to insert the correct characters in the positions left by the assembler.

The correct characters for the command are placed in the code and the correct values to detect the end of the transfer are also placed in position.

The buffer is now created starting at &3000 and the user is free to load an eprom blowing program. Page will be either &E00 or &1900 depending on whether a disc system is fitted or not.

The user therefore has from this point to &2FFF for an eprom blowing program, and most available programs should fit in this area.

The code has certain peculiarities in it attributable to the non-use of JSR and JMP instructions. Unfortunately the first version of the assembler cannot assemble code for use in a location other than that which it is being assembled. Therefore it is not possible to use instructions which use absolute addressing.

Likewise, the first version of the assembler cannot insert bytes or strings in the code, so we must leave the assembler and use Basic indirection operators for this purpose.

This program will run on either of the two current versions of Basic.

Sideways ROM listing

```
100 MODE 7
110 *FX225.1
120 PRINT "***************************
    ***************":
130 PRINT "*   EPROM BASIC DUMP PROGR
    AM           *":
140 PRINT "*
                     *":
150 PRINT "*   NOV 1983
                  LB   *":
160 PRINT "***************************
    ***************":
170 VDU 28.0.24.39.5
180 PRINT
190 PRINT "PREPARE BASIC PROGRAM
     AND PRESS FUNCTIONKEY 0 WHEN
     READY"
200 *KEY 0 P%=PAGE|MPAGE=&3200|MNEW;M
    REM NOW LOAD REQUIRED BASIC
     PROGRAM
    :- PRESS FUNCTION KEY 1 WHEN
     COMPLETED|M
210 *KEY 1 L%=(TOP-PAGE)|MPAGE=P%|MOL
    D|MGOTO230;M
220 END
230 HIMEM =&3000
240 PRINT
    :PRINT :
250 INPUT "INPUT EPROM TITLE :-"T$
260 T$=LEFT$(T$.10)
270 TL%=LEN (T$)
280 PRINT
290 INPUT "INPUT AUTHOR'S NAME :-"C$
300 C$=LEFT$(C$.15)
310 CL%=LEN (C$)
320 PRINT
330 INPUT "INPUT REQUIRED STAR COMMAN
    D (OMIT STAR) :-"COM$
340 COM$=LEFT$(COM$.10)
350 COM%=LEN (COM$)
360 FOR X%=0TO 2 STEP 2
    :REM SET UP LOOP FOR TWO PASS
     ASSEMBLER
370 P%=&3000
380 [OPT X%
390 BRK
    :BRK
    :BRK \SET LANGUAGE JUMP TO 00s
400 JMP &8030 \SET SERVICE JUMP
410 ]
420 REM
430 REM
440 REM
```

→

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

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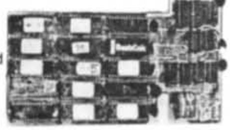

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Three angles on software for schools

Pascal, Sequences, Puncman
Chalksoft

WHEN I was asked to look at these programs I was delighted. At last, Pascal on my Beeb! I might even be able to use the other two to amuse a class while I write a Pascal program. Unfortunately, all was not as it seemed.

I sat waiting for the tape to load. Is it an interpreter or a compiler? The answer was soon revealed. It is a program to draw Pascal's Triangle. Once over initial disappointment, I decided to see if I could use the program with any classes.

I did not like the program at all. It kept drawing the triangle and showing various patterns in it. I thought that, as a teacher, I did not have enough control over the speed, and it was far too slow for some classes.

A fact that I have not seen documented is that if you hold the space bar down the program seems to go faster.

I found the program's habit of keeping asking questions irritating, especially as it never seemed to want an answer. For example: "Do you understand what I mean?"

Some of the sound effects palled after a time too, and there was no way to switch them off. Some colour combinations were very difficult to read even on a monitor.

Overall, I think the job this program does could be carried out far better by a film or a video.

On the reverse side of the tape are some questions. The first is: "Have you seen the program about Pascal and his Triangle?". Before I had chance to answer it I was told if not, see it now.

The real questions followed. I could have asked the class the questions myself just as easily with the same effect as using this tape.

Sequences is a similar program to Pascal in many ways. The irritating sounds, the redundant questions, the fact that the teacher has little control of the speed, and the difficult-to-read colours are there again.

From a menu, it is possible to select any one of seven types of series. I found halving (the first series) poorly explained. Fibonacci (the second series) is an interesting enough topic to deserve a program on its own, and this certainly does not do it credit.

The third series is prime numbers and I felt that nothing would have been gained in showing this section to a class. The square and triangular numbers sections drew quite good patterns on the screen and if a teacher's blackboard presentation is not of the highest quality, these sections could be of use.

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1

The final two series are the multiples of 3 and 9. The program says that the digits of a multiple of 3 add up to 3, 6, 9 or 12. What about 1731587142? The digits add up to 39.

The program says nothing about the fact that 3 + 9 = 12 and then 1 + 2 = 3. In fact the digit sum for multiples of 3 is 3, 6 or 9 if the process is repeated, a fact the program does not mention.

There is a similar fault in the multiples of 9 section, where we are told that the digits add up to 9 or 18.

Again I did not like this program. I have seen films that illustrate many of the points in this and the Pascal's Triangle program far better. They certainly would keep a class's attention better.

I thought Puncman a very good idea. Children always enjoy a game, and with this one they may learn something about punctuation as well.

Puncman (a little fellow who looks a bit like Pacman), writes a story about himself and Nosher (the baddy) on the screen.

Greedy Nosher then goes round and eats all the punctuation marks and takes them to the bottom of the screen.

It is the pupils' task to guide Puncman to these punctuation marks, pick them up and take them to the correct place.

The pupils I tried it on found it fun at first, but a little slow as they became used to it. In this age of arcade games I felt that some pupils could have coped with a higher speed.

The program is quite well written, although Puncman occasionally overran the mark when I let go of a key. As with the other two programs I looked at, I found the lack of documentation infuriating.

The only way to find out what the program does is to try it or read the advertisements. The instructions at the top of the screen are easily missed.

One fact that could be put in documentation is how to change the stories. Many teachers like to use their own texts. It is very easy to insert your own stories into the program, but it is left to the teacher to find out how.

Overall, I found this quite a useful program. Most of the children I tried it on enjoyed it as much as you could expect them to enjoy an educational program.

But the "arcade experts" found it too slow as a game and would have preferred to carry a full stop round the screen faster (even if they still took a long time to decide where it went).

Pete Davidson

It's fun, whatever it is...

Galactic Firebird
Kansas City Systems

I DON'T really know what this game is supposed to be doing, but I do know that it's fun!

I don't know what's happening because the instructions don't actually tell you what the game is about. All you get by way of a hint is the name, Galactic Firebird, and the loading instructions.

Being an inquisitive soul, I fed it into my micro and tried to figure out what was happening.

The first thing I noticed was a laser base. Now, where there's a laser base at the bottom of the screen it's a fairly safe bet that there'll soon be hordes of nasty aliens coming at you. And so it turned out.

And, of course, having a laser base it's a safe bet that you've got to zap them.

I don't know what exactly it was I was zapping, but they fell into three main types.

The first began life as a shower of purple dots which turned into multicoloured "snowflakes". These join together to form colourful, rapidly rotating circles and are fairly easy to shoot.

Easy, that is, if you can avoid the "blue meanies" which hover around taking potshots at your base. These can be quite a nuisance as they dodge laser bolts and it takes five shots to destroy them.

This is not forgetting the green bombs which explode on hitting the bottom of the screen and can destroy your base from a distance.

At least I think that's what they do. Certainly there's nothing to tell me any different.

Still, the game controls are well explained and it is colourful and noisy enough to satisfy any action game freak. I certainly enjoyed it.

I just wish I knew what it was I was supposed to be enjoying.

Chris Barton

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Escape from Orion *Hopesoft*

WHEN I loaded Escape from Orion my first thoughts were: "Oh no, not another of these". It looked ominously familiar: The usual layout of a screen split into several levels connected by ladders and so on.

I was against it from the start, and resigned to being bored out of my mind. Then I was pleasantly surprised.

For one thing the graphics are quite nice and the instructions reasonably adequate.

For another, although the concept and theme of the game are fairly standard, the options built into it are excellent and help you tailor the game to suit your needs.

The idea is that your spacecraft is in trouble. You have to land on an alien planet and gather various items so that you can repair the ship and take off again.

There are the usual time limits, unpleasant aliens, ladders, gaps and moving platforms and you have your little man to guide through these hazards.

Nothing special there you might think, and I'd agree with you. But it's fun.

I found myself addicted to it in a short time, reaching for the space bar to start another game as soon as my final little man had met his doom.

The game actually admits that some people can't yet afford colour monitors and allows you to choose between two versions, one for black and white, the other for the rich.

As well as this they give you the option of switching off the sound effects – a feature I wish more games allowed.

They also permit you to choose between four levels of skill and have up to four screens on each. You can pick which screen and level of difficulty on which you want to start.

I opted for level one, screen one. The 10-year-old next door starts on level four screen three. I have never liked that child.

I do like Escape from Orion and recommend it for those looking for a game of speed and skill. Not stunningly original, but it's fun. What more could you ask?

Trevor Roberts

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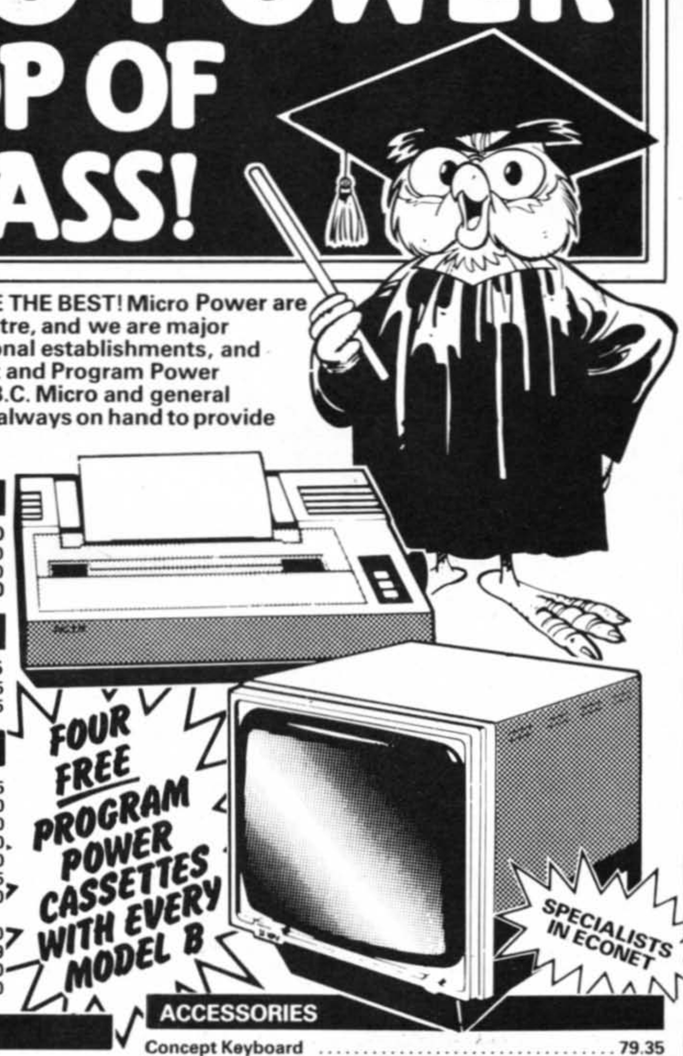
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BeebSynth *Clares Software*

BEEBSYNTH is an envelope definer and music synthesiser for the Model B requiring a 1.2 OS.

The software is divided into two Basic programs, the first of which contains instructions and some preliminary setting up. The second program CHAINs after this, and you are presented with a mode 1 display made up of red squares and the mundane title of Envelope Definer.

There are 16 squares, each of which holds a figure of the ENVELOPE and SOUND statement. You use the horizontal cursor keys to move around between the squares and the vertical ones to change the numbers up or down.

Moving between the figures is quite slow, although you can change them at quite a reasonable pace. Reactions to your key presses are quite sluggish as well.

You play the sound by pressing the space bar. Six of a possible 16 envelopes are already defined for you.

As you switch envelopes, that particular ENVELOPE statement is displayed at the top of the screen (although it only changes when you press the space bar to play the sound).

You cannot change channel to define sounds using the noise channel. This is a shortcoming for any envelope definer, but is just about acceptable considering the nature of the software.

Pressing K gets you on to the keyboard synthesiser, which over a period of seven seconds draws a picture of a small – 23 note – piano keyboard at the bottom and diagrams of useful keys to press at the top of the screen.

Each key on the screen keyboard is simulated on the BBC Micro, and you can play away through a limited range.

There is a tuning feature which allows you to alter the pitch of the entire keyboard. But playing tunes will not be affected as the keys are the same pitch relative to each other.

There are three ways of checking the keyboard, the first two of which simulate monophonic and polyphonic keyboards.

These are quite uninteresting when compared with the third method, which actually simulates an echo, giving an extremely professional air to it.

I'm quite sure that any pop star who was blindfolded would think it was a real synthesiser, as the effects you can produce are quite startling (although some of the pre-defined sounds resemble those cheap keyboard-cum-calculators).

You can use any one of the 16 envelopes you have defined, although switching between them is a bit labour-intensive, demanding up to four key presses to change.

You can make sure that the sound cuts off after you release a key, in case the release phase is too long and annoying (a handy feature). Pressing Escape returns you to the definer.

You have to mess about a lot if you want to save the envelope data for future use.

The instruction sheet merely tells you to Break out of the program and do a *SAVE command to save the actual envelopes data which the OS stores in memory below PAGE.

This is a daunting task, to say the least, especially to someone who is unfamiliar with *SAVE.

Looking at the software overall, it seems like a small keyboard player program tied onto a below-average envelope definer.

I think this general approach is unhelpful as the two sections use up too much memory for themselves to facilitate many good features.

Two programs, one concentrating upon ENVELOPEs and waveforms and the other a fully programmable synthesiser with memory would have been more satisfying.

But you can have a lot of fun with the synthesiser and the envelope definer is useable, so at £7.95 for the cassette version and £10.95 for the disc Clares BeebSynth is worth the money, especially when you look at the prices of rival companies' efforts.

Martin Galway

...and gunfire

Gunsmoke *Software Invasion*

HAVE you ever had one of those days where you feel like picking up a gun and shooting a few dozen people?

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You play the lawman, controlling an animated figure who walks up and down the street.

Suddenly you're under attack from up to 16 baddies who appear in the windows of the buildings and shoot at you.

You have to run to avoid the bullets and then fire back. It helps to be a crack shot.

Even if you get hit you have three lives and, as a special offer, for every 16 gunmen you kill you get an extra life.

It's a simple game that will appeal mostly to children. The animated man could be a little better but otherwise the graphics are excellent and the whole thing well designed.

Not too difficult, it's the kind of game that has spectators looking over your shoulder yelling: "Saloon, top window. Quick!". That makes it definitely a game for the family – simple but enjoyable.

Nigel Peters

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RECURSION, like machine code, seems to strike fear into the hearts of computer novices. There's no need for this, however, for when properly explained these subjects are really quite straightforward. In this article, CHRIS MARTIN shows how simple, and useful, recursion really is.

A micro's work is never done . . .

By CHRIS MARTIN

THE Dombot paused. He had been told: "Clean out the kitchen". And obedient as always, he had started on his task immediately using the "clean out kitchen" routine.

But before long he discovered that the waste bin was in its way and it was full. The bin needed emptying before the kitchen could be completely cleaned.

He stored the kitchen map – that is, the task list for kitchen cleaning – and made a note of how much of it had been processed.

He then set one of his subprocessors to search for the "clean out waste bin" routine. It was the same as the "clean out kitchen" routine only with "waste bin" instead of "kitchen".

Soon a stream of bits entering his main memory told him that the search had been successful. He automatically logged the elapsed time, .97 microseconds, checked it against his built-in error margins and reset the error trap. This would have immobilised him in another couple of hundred nanoseconds if nothing had been done.

He then opened the back door and took the bin outside, only his sensors told him that the backyard was dirty and needed cleaning out. He had to act.

He stored the position he had reached in "clean out waste bin", entering "clean out yard" when he had done so. He soon did it.

The Dustbot had spilt rubbish all over the place emptying the dustbin. While going back to the house, he opened a channel to Dustbot Central and logged a complaint.

Having done this he cleared "clean out yard", marking it successful and restored "clean out waste bin", looking at the saved position to see where he had left off.

This completed, he left the waste bin and continued with his primary task.

The purpose of this story is to illustrate a recursive method. If you consider the robot to obeying a procedure "clean out", this was called first with a set of parameters directing it to the task "clean the kitchen".

While it was performing the steps of this task it discovered that it could not complete it without calling itself to complete a subtask – "clean out waste bin".

This subtask also could not be completed without the robot obeying the procedure and calling itself again (now three levels down) to clean out the yard.

When this last task was completed it could return to its second level task – "clean out waste bin". When this, in turn, was completed it could continue on its top level task.

Note that to be able to take up a higher level task again, it saved the position it had reached in the current task before it started the new one.

This is the essence of recursion. First, a procedure is called, and must call itself again with different parameters. If they were the same parameters it could never finish its programmed function.

Secondly, it saves information about how far it has got. The first part of this process (the recursive call) must be worked out by the programmer, who determines the way the parameters must change at each call to a deeper level.

The second part, remembering where everything is, will be done for you by the BBC Micro's Basic.

Here is a simple example of a recursive procedure. It doesn't do anything terrifically important except illustrate the idea:

```
DEF PROCplunge (Level)
IF Level > 0 THEN PROCplunge
(Level-1)
PRINT "Returning from PROCplunge
("Level")."
ENDPROC
```

If you call this procedure with

PROCplunge(9)

you will get 10 lines printed out starting with "Returning from PROCplunge(0)" and ending with "Returning from PROCplunge(9)".

From the procedure you will see that it cannot print until it calls itself with Level = 0, and as soon as it returns from this it will print for all the levels 1 to 9 as the subtask is completed in each case.

COMPETITION

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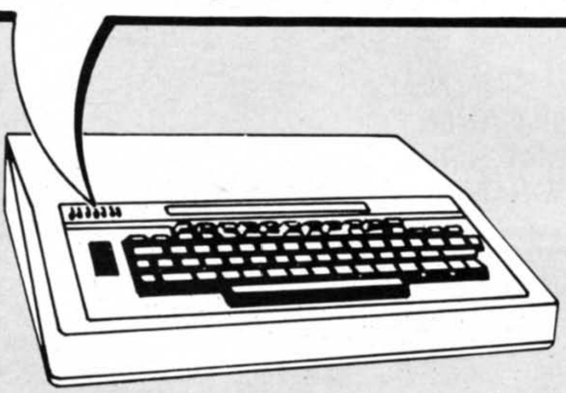

THIS month's competition is another test of your programming skill. The idea for it came about when we were looking for original examples of recursion – we couldn't find all that many!

So that's the competition. We want an original, well structured example of recursion, suitable for a beginners' course, that takes no more than 25 lines of code.

If you're not too sure of exactly what recursion is, Chris Martin's article on the opposite page should help you.

This month we shall select not one but *three* prizewinners. Each will receive one of Acorn's exciting new speech synthesiser chips.

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JULY'S COMPETITION WINNER

The winner of the Epson FX-80, the prize in our July crossword competition, was Graeme Davies of Guildford, Surrey. His clue for the answer "BBC" was:

Initially Babbage began computing

1 M	A	2 C	H	3 I	N	4 E	■	■	■	■	■	■	■	5 R
O	■	U	■	N	■	V	■	■	6 B	U	B	7 B	L	E
T	■	8 R	E	P	E	A	T	■	■	■	■	I	■	M
H	■	S	■	U	■	L	■	■	9 S	O	R	T	■	■
E	■	10 O	P	T	■	■	■	■	P	■	■	W	■	11 A
R	■	R	■	■	12 B	13 A	S	I	C	■	14 L	I	S	T
■	■	■	■	■	■	S	■	■	■	15 B	■	S	■	N
16 B	B	C	■	17 M	18 I	C	19 R	O	■	20 U	S	E	R	■
O	■	■	■	■	N	■	A	■	■	G	■	■	■	21 B
A	■	■	■	■	22 T	I	M	E	■	■	23 D	■	■	Y
R	■	24 C	O	D	E	■	■	■	25 B	■	R	■	■	T
26 D	O	T	■	■	G	■	27 V	A	R	I	A	B	28 L	E
■	■	R	■	■	29 E	N	D	■	K	■	W	■	O	■
30 C	O	L	O	U	R	■	U	■	■	■	■	■	G	■
■	■	U	■	■	■	■	■	31 D	E	F	P	R	O	C

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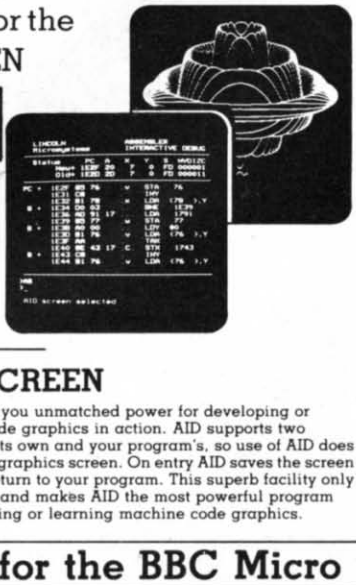

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PART 9

By MIKE COOK

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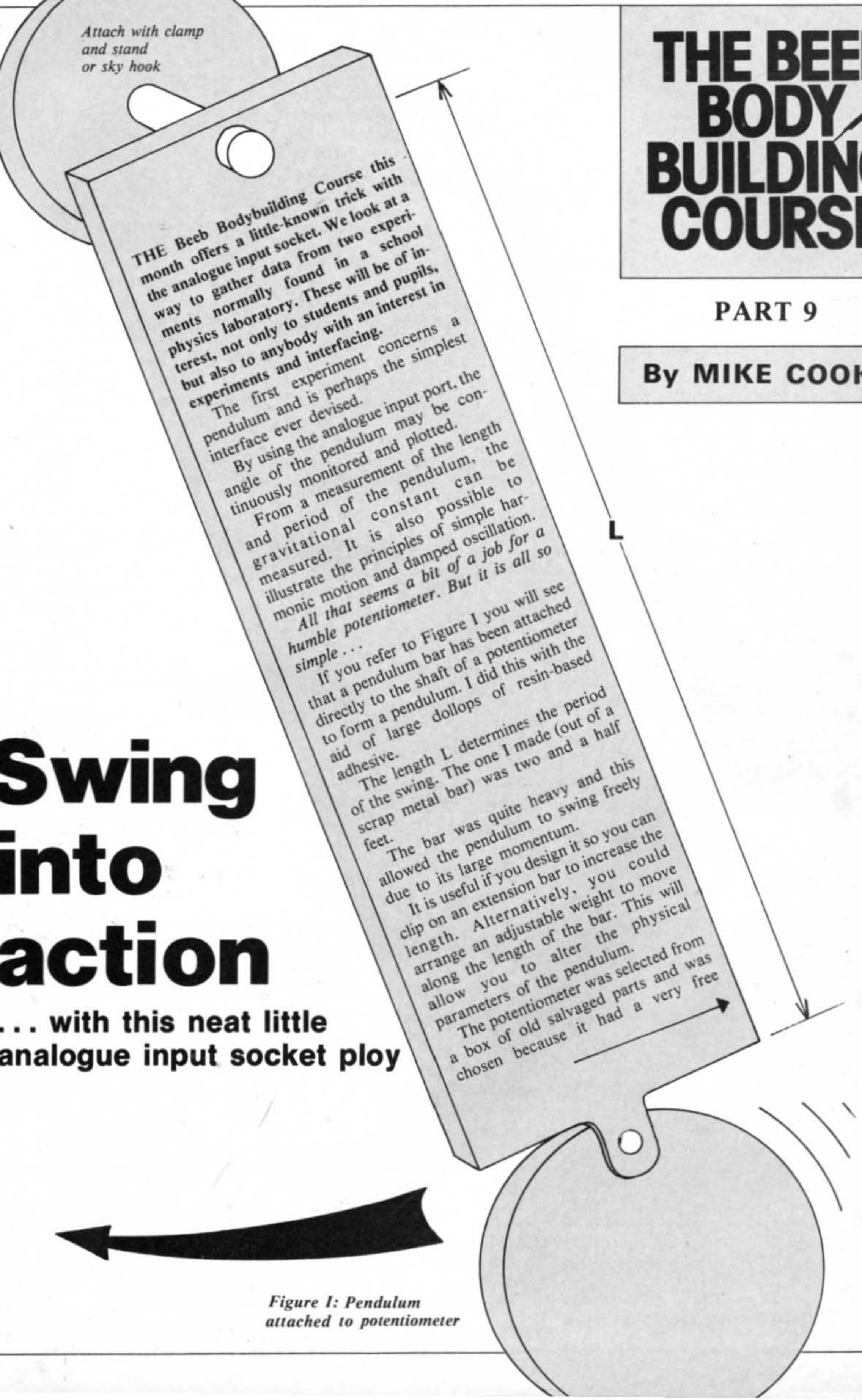


THE Beeb Bodybuilding Course this month offers a little-known trick with the analogue input socket. We look at a way to gather data from two experiments normally found in a school physics laboratory. These will be of interest, not only to students and pupils, but also to anybody with an interest in experiments and interfacing.

The first experiment concerns a pendulum and is perhaps the simplest interface ever devised.

By using the analogue input port, the angle of the pendulum may be continuously monitored and plotted.

From a measurement of the length and period of the pendulum, the gravitational constant can be measured. It is also possible to illustrate the principles of simple harmonic motion and damped oscillation.

All that seems a bit of a job for a humble potentiometer. But it is all so simple . . .

If you refer to Figure I you will see that a pendulum bar has been attached directly to the shaft of a potentiometer to form a pendulum. I did this with the aid of large dollops of resin-based adhesive.

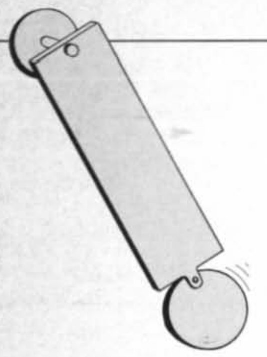
The length L determines the period of the swing. The one I made (out of a scrap metal bar) was two and a half feet.

The bar was quite heavy and this allowed the pendulum to swing freely due to its large momentum.

It is useful if you design it so you can clip on an extension bar to increase the length. Alternatively, you could arrange an adjustable weight to move along the length of the bar. This will allow you to alter the physical parameters of the pendulum.

The potentiometer was selected from a box of old salvaged parts and was chosen because it had a very free

Figure I: Pendulum attached to potentiometer



From Page 69

movement. This is usually associated with wirewound pots, but the modern conductive film type are also suitable.

On the older type of pots the construction is such that an adjustment can be made to make the shaft move more freely. However, if enough weight is used to make the pendulum, just about any type of pot may be used.

For a really Rolls Royce job you can use a servo mechanism feedback pot, but they will cost you about £15 from a radio accessories dealer.

If the pot is free to move, the damping effect will be reduced and the amplitude of successive swings will be very similar.

However, it is very informative to look at the effect of damping on the period of the pendulum, so you might consider making two of them.

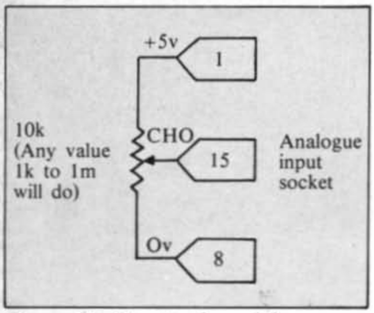


Figure II: Circuit of pendulum

The electrical connection to the BBC Micro is simplicity itself. Just three wires are needed and are shown in Figure II.

The pin numbers are marked on the 15 way D-type plug and can be read with the aid of a normal domestic electron microscope.

The end of the pot is taken to +5 volts to allow the swing to produce more change than it would if taken to the Vref connection.

The A/D converter can stand up to 5 volts and so is in no danger from wildly swinging pendulums – which is more than can be said for the onlookers.

With the connections made, the program in Listing I allows the pendulum's path to be plotted graphically on the screen.

Before running the program the pendulum must be at rest. Line 150 notes the reading and will not start to plot until the reading is less than this.

To plot the path, first move the pendulum to one side. At this point the trace will start to move across the screen because you have chosen the wrong side to lift.

Not to worry. Use this opportunity to rotate the pot in order to get a central trace. Then run the program again and lift up the correct side.

When it is released the computer will start to plot its path. The number of cycles plotted can be altered by changing the delay value in line 210.

When the plot is completed the program waits until it is "armed" again by pressing a key. If the key pressed is "C" the screen will be wiped clean before the next plot.

This allows two or more plots to be shown and (hopefully) allows the student to observe that the period is independent of the amplitude.

This program is only a beginning, as many more parameters may be extracted from the measurements such as the period of the pendulum, the amplitude of the swing and the exponential rate of decay.

Many experiments can be performed with a simple pendulum, and programs can be written to illustrate other aspects of a pendulum's behaviour.

Students derive interest and motivation from the fact that a real time experiment is being monitored by the computer.

The next experiment I would like to consider is the charging and discharging of a capacitor. When I was a student this was my first introduction to exponential functions.

By using the computer as a storage oscilloscope, students will find this easy to appreciate.

I have seen programs that simulate this, but there is no substitute for the real thing, complete with errors and tolerances.

The principle behind the interface is simple. All we need to do is monitor the voltage across a capacitor, first when a series resistor is at a positive potential and then when it is at earth potential.

The voltage when plotted against time will be an exponential function.

The full circuit is shown in Figure III. Hold on to your hats – what follows is an explanation of how it works.

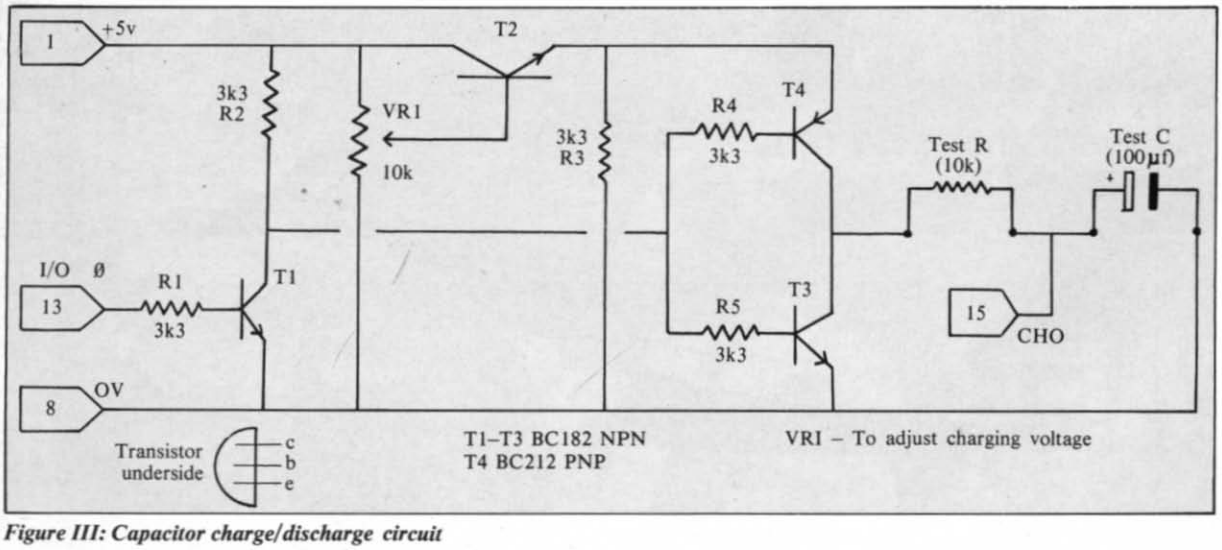


Figure III: Capacitor charge/discharge circuit

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Transistors T4 and T3 connect the resistor in the test circuit to a positive or earth potential, depending upon which is turned on.

Due to the fact that T4 is a PNP transistor and T3 is the NPN variety, only one can be turned on at any one time.

When the voltage at their bases is high, T3 is on and T4 is off, and when this voltage is driven low, T3 will turn off and T4 will be on.

A PNP transistor is sometimes known as an upside-down transistor as, to turn it on, you reduce the voltage on the base.

***Body Build Pack No. 7:* 1 Conducting plastic potentiometer (for the pendulum), 5 3k3 resistors, 3 BC182 NPN transistors, 1 BC212 PNP transistor, 1 100 uF test capacitor, 1 10k test resistor, 2 15 way D-type plugs, 3 ft. multi-way cable, 1 small piece of Veroboard, 1 10k preset resistor.**

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These two transistors are controlled by T1, thus deciding whether the capacitor is charging or discharging. This controlling can be done by one of the bits on the user port. However, this entails another lead into the computer.

A much more elegant solution is to use the fire button connection to do the switching. But, I hear you say, the fire button is an input, so how can it switch anything?

Well a look at the circuit diagram of the BBC Micro reveals that both fire buttons are connected to the system VIA and so they can be reprogrammed to act as outputs. This can then be connected to T1 to control the circuit.

Finally, when the capacitor is charging, it is doing so up to some potential. The obvious choice is to make this the Vref voltage, available on the input socket.

This has, however, a high impedance, which would in effect add itself to the value of the test resistor – and this would tend to defeat the object of the experiment.

To prevent this T2 provides a low impedance voltage for the capacitor to aim at. This voltage can be set by VR1, allowing students to see the effects of changing it.

A load resistor, R3, is used to bleed current through T2 and make the emmitter follower action work.

A simple program to plot the charge and discharge is shown in Listing II. This will repeatedly show a charge and discharge cycle for the capacitor under test.

Line 110 reprograms the fire button to be an output, but unfortunately the operating system still thinks it is an input.

Consequently the output on this pin can change if you print a message on the screen or press a key on the keyboard.

This needs to be borne in mind when expanding this program to perform other experiments, such as the determination of the component tolerances by comparing the actual trace with the theoretical.

Line 170 toggles the output line to give alternate charge and discharge of the capacitor.

The construction is straightforward and can be done in your favourite way. None of the values of the components are critical.

You might have noticed that all the resistors are 3k3. This simplified construction and helped to get rid of a lorry load of 3k3 resistors that I happened to inherit!

These two experiments just scratch the surface of what can be done with the BBC Micro in the physics lab, and if this article receives a good response we shall be looking at more complex problems later in the series.

In the meantime, next month I shall be telling you how to make your BBC Micro the star of this year's Christmas party.

→

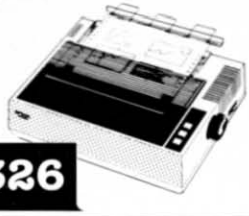
```
 10 MODE 7
 20 PRINT "PENDULUM PLOTTER"
 30 PRINT "Beeb Bodybuilding Course"
 40 PRINT "THE MICRO USER November
     1983"
 50 PRINT "By Mike Cook"
 60 PRINT
    :PRINT
 70 PRINT "PRESS ANY KEY TO ARM THE
     PLOTTER"
 80 PRINT "PRESS THE 'C' KEY TO CLEAR
     THE SCREEN"
 90 *FX16,1
100 A=GET
110 MODE 4
120 REPEAT
130 H=(ADVAL (1) DIV 64)+30
140 REPEAT
150 A=ADVAL (1) DIV 64
160 UNTIL A>H
170 MOVE 0,A
180 FOR X=0 TO 1279 STEP 4
190 A=ADVAL (1) DIV 64
200 DRAW X,A
210 FOR B=1 TO 30
    :NEXT
220 NEXT
230 A$=GET$
240 IF A$="C"
    THEN CLS
250 UNTIL FALSE
```

Listing I

```
 10 MODE 7
 20 PRINT "CAPACITOR CHARGE/DISCHARGE
    "

 30 PRINT "Beeb Bodybuilding Course"
 40 PRINT "THE MICRO USER November
     1983"
 50 PRINT "By Mike Cook"
 60 PRINT
    :PRINT
 70 PRINT
    :PRINT
 80 PRINT "PRESS ANY KEY TO START"
 90 *FX16,1
100 A=GET
110 ?&FE42=?&FE42 OR %10
120 Y=0
130 MODE 0
140 REPEAT
150 CLG
160 MOVE 0,Y
170 ?&FE40=?&FE40 EOR %10
180 FOR X=1 TO 1279 STEP 2
190 Y=ADVAL (1) DIV 64
200 DRAW X,Y
210 NEXT
220 UNTIL FALSE
```

Listing II



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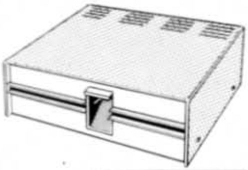

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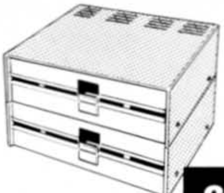

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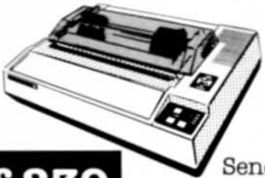

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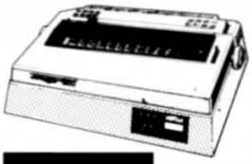

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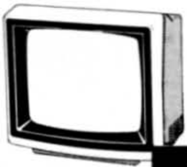

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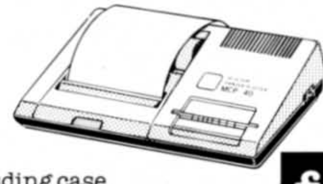

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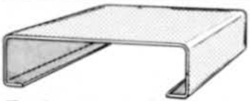

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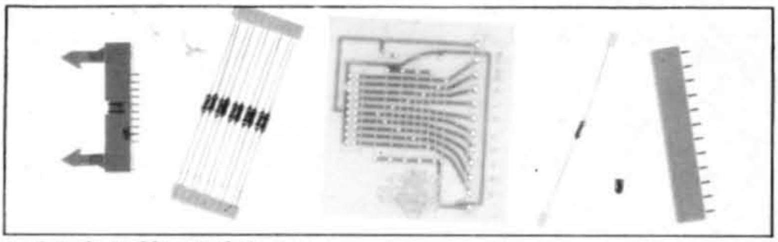

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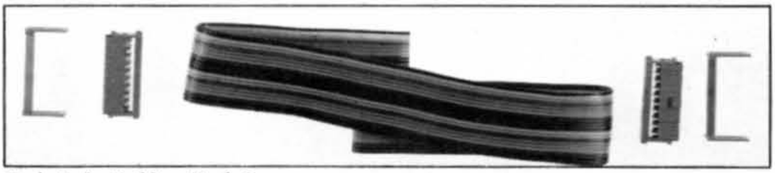

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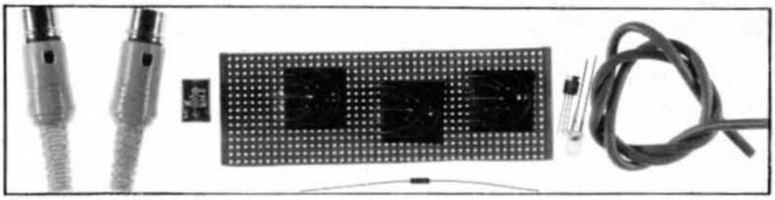

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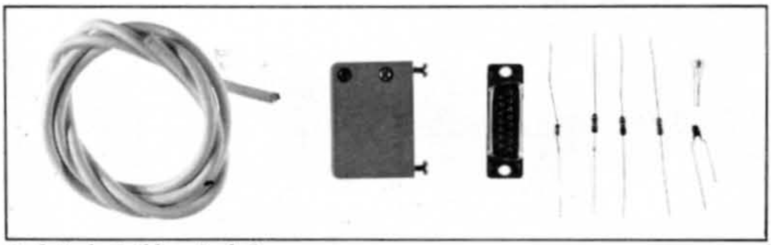

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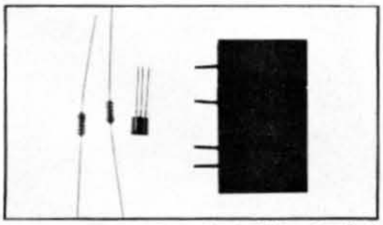

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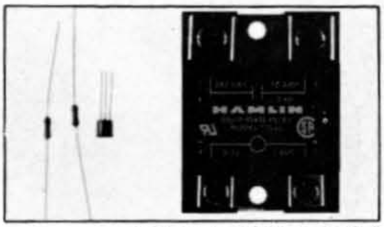

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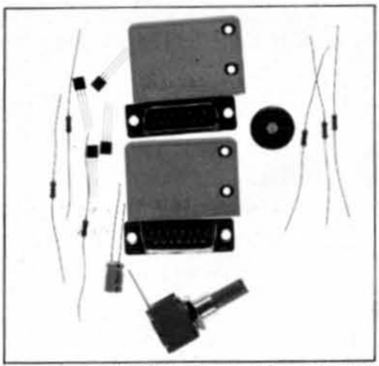

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SOUND ADVICE

THE Editor came by my desk. "You'll do", he bellowed into my ear. "I want a tale told by an idiot, and you're just the man for the job".

"What do you mean, told by an idiot?" I asked, idiotically.

"Full of SOUND", he shouted as he entered his office.

"And fury", I seethed, quietly.

"And ENVELOPE", our Editor added as he slammed the door.

The Technical Editor slowly raised his head from his desk. "ENVELOPE isn't in Macbeth, is it?"

No, it's not, but the SOUND and ENVELOPE commands are in the Basic vocabulary of your BBC Micro, and with them you can do all sorts of noisy wonders.

And this idiot's tale will let you into the secrets of how to do them.

ALL the various sounds and noises that come from your micro while playing games have probably given you some idea of the scope of its sound-producing abilities.

These range from derogatory noises when you lose a game, through simple tunes and even onto imitating musical instruments. Yet they come from a single speaker.

All the marvellous sound effects are produced with just two Basic commands, SOUND and ENVELOPE. It's the skilful use of these that gives the BBC Micro its musical abilities.

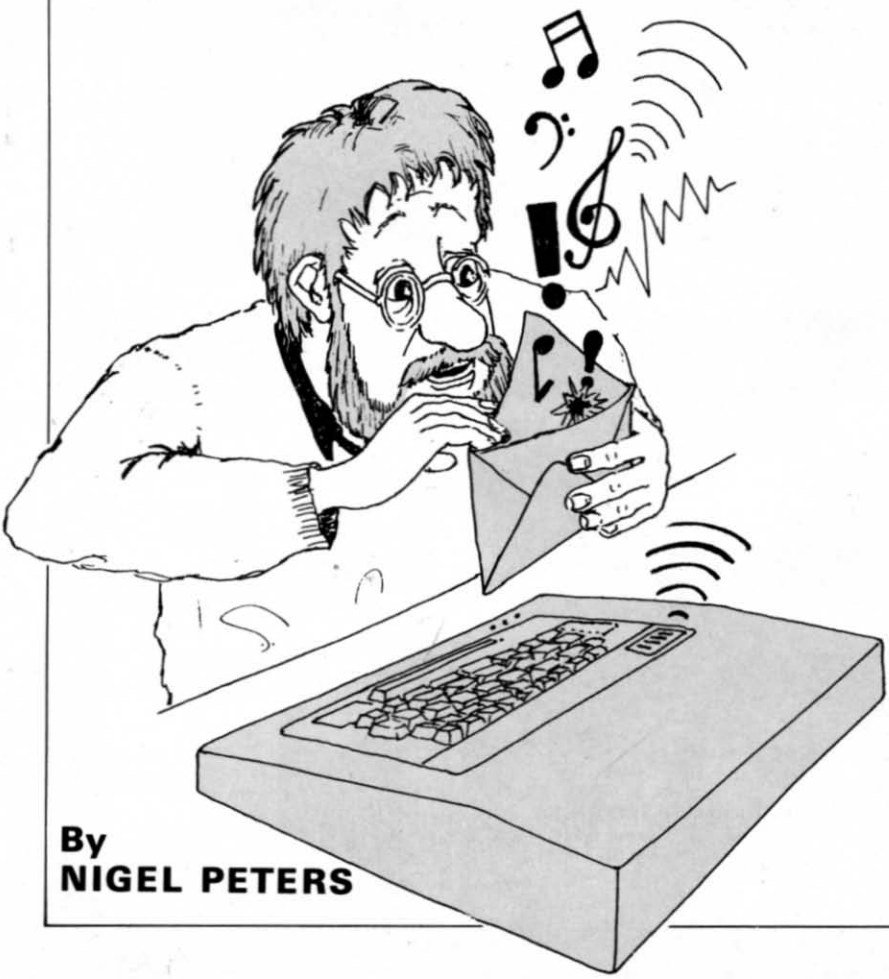
We'll deal with both as my tale unfolds, but for the time being let's start with the simplest, the SOUND command.

This can be viewed as a single keyword, SOUND, followed by four numbers separated by commas.

The SOUND keyword tells the micro to make a noise. The numbers decide how long the noise will last and what it will sound like. The structure of the command is:

```
SOUND w,x,y,z
```

where w, x, y and z represent the figures that are used to control what sort of sound is actually going to be produced.



We'll deal with each of these parameters in turn, but first let's make a noise. After all that's what all this is about.

Type the following into your micro:

```
SOUND 1,-15,53,20
```

Now press the Return key and you should get a single note. It'll last for one second, be as loud as your micro can make it and, for the musically inclined, will be middle C in pitch (more or less).

Don't worry how it's done for the moment. Just try it out and see that the SOUND command, with those four figures after it, does produce a note.

Later we'll be playing around with this basic note in order to give examples of how the SOUND command can be controlled by these four numbers.

Now let's deal with each of them in turn and see how they affect it. Remember the structure is:

```
SOUND w,x,y,z
```

The figure we put in the place of the w decides which channel will be used to produce the noise that the SOUND keyword tells the micro to make.

The BBC Micro's sound generator has four channels, each of which can produce a note simultaneously. This means that you can have four notes playing at the same time, one on each channel.

Actually, doing that lies in the future. For the time being let's just stick with producing one note at a time.

As I've said, there are four channels and they can be selected by making w equal to 0, 1, 2 or 3. Let's ignore channel 0, the "special effects" one, and just deal with channels 1, 2 and 3. Any of these can be used to produce a note.

Program I has each of them in turn making the noise we made before. The SOUND command is just the same except that each time round the FOR... NEXT loop the channel number, w, varies.

At first it's 1 (for channel 1 to be

→

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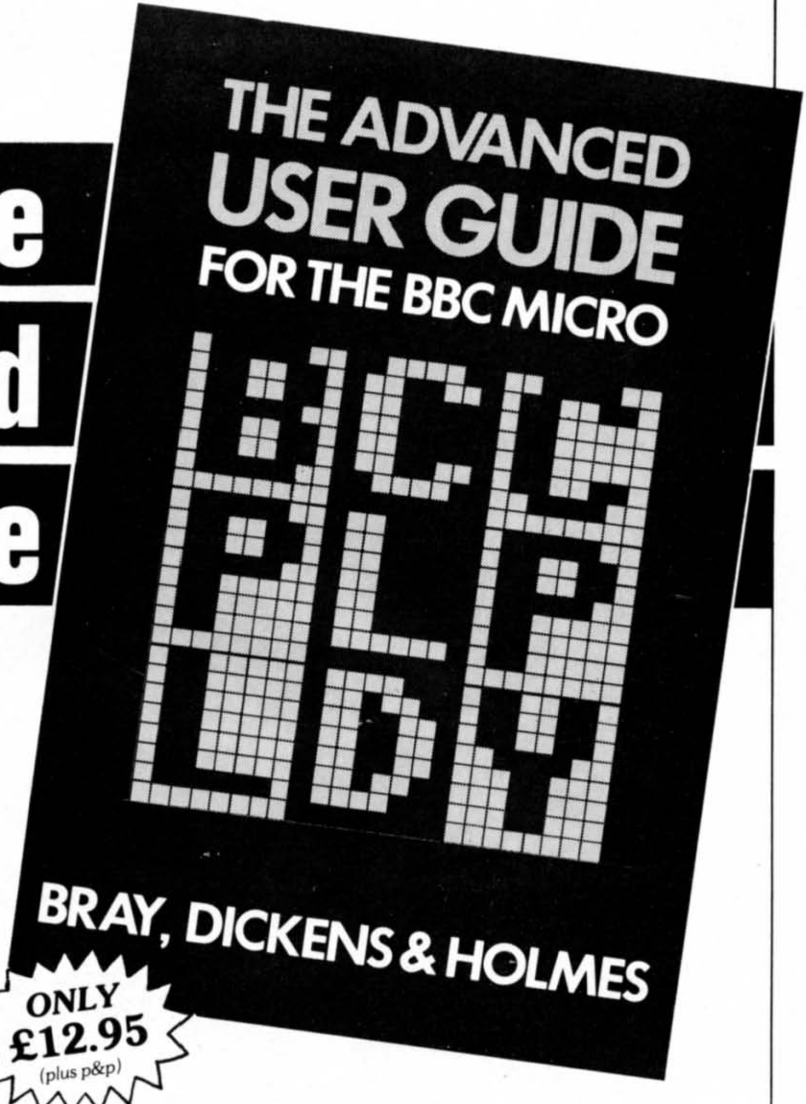

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From Page 75

used), and then 2 (for channel 2) and 3 (for channel 3).

```
10 REM PROGRAM I
20 FOR channel=1 TO 3
30 SOUND channel,-15,53,20
40 NEXT channel
```

Program I

This, however, may not convince you that three separate channels have been used, as it just sounds like one note.

Well, then, for the Doubting Thomases among you there's always Program II, which produces a different note on each of the three channels at the same time – giving us, in fact, a chord.

```
10 REM PROGRAM II
20 SOUND 1,-15,53,20
30 SOUND 2,-15,69,20
40 SOUND 3,-15,85,20
```

Program II

You might notice that we have selected each channel by the figure we've placed in the w position. The different notes have been produced by varying the y parameter, of which more later.

The next parameter to consider is x. The number we place in this position can vary between 0 and –15 and determines how loud the note will be. Strangely enough the loudest note is produced by –15, the quietest by 1.

Putting 0 in the place of x produces silence. This can be very useful as sometimes you may need silence to separate two notes. In fact 0 loudness is used in a later example.

Program III produces the original note again, the loop varying the value of x so that the note gets quieter each time around.

```
10 REM PROGRAM III
20 FOR loudness = -15 TO 0
30 SOUND 1.loudness,53.20
40 FOR x =1 TO 3000
   :NEXT x
50 NEXT loudness
```

Program III

Don't worry too much about line 40. It's just there to slow things down a little and produce an appreciable gap between the notes.

Notice how the sound seems to fade away into the distance. You've got your first sound effect!

Leaving the parameters that select the channel and the loudness, we'll move onto the figures that go in the place of y in the SOUND command. It's these that determine the pitch of the note produced.

Pitch is just a term used to describe whether a note is high or low. A note that is high in pitch well have you squeaking if you try to sing it. One that is low in pitch will have you "singing in your boots", as my old music master used to say.

It's easy to vary the pitch of the notes produced by replacing y with a figure between 0 and 255.

The lowest note you can get on the micro is with y equal to 0, the highest with y equal to 255.

If you can stand it, Program IV will demonstrate the notes available, using a loop to vary the y parameter from 0, the lowest note, to 255, the highest.

```
10 REM PROGRAM IV
20 FOR pitch=0 TO 255
30 SOUND 1,-15,pitch,20
40 NEXT pitch
```

Program IV

It lasts over four minutes, the note slowly creeping upwards, so it's no disgrace to press ESCAPE!

Incidentally, you might like to reverse the loop to get a descending series of notes. I leave that to you.

```
10 REM PROGRAM V
20 FOR pitch=0 TO 255 STEP 4
30 SOUND 1,-15,pitch,20
40 NEXT pitch
```

Program V

You might find Program V more bearable. This does the same thing, only the notes go upwards in steps of four, technically known as semi-tones. These sound much more natural to our ears. More about them later.

The final parameter is z, which determines the length of each note. This can vary from 0 to 254 in value. The figure 20 in the place of z gives a note of one second's duration. You could say that each unit was worth one twentieth of a second.

If you put 200 in the duration parameter you would get a note lasting 10 seconds. If, for peverse reasons of your own, you make z either –1 or 255 then the note will continue to sound indefinitely.

Try it – you can always press ESCAPE when you've had enough. It makes Program IV seem interesting by comparison!

Program VI again uses a loop, this time to vary the length of the note from nothing to 12.7 seconds. You'll notice that by having 0 in the x position, line 40 produces a sound that has zero loudness. This is just to provide a gap between the example notes.

```
10 REM PROGRAM VI
20 FOR duration=0 TO 254
30 SOUND 1,-15,53,duration
40 SOUND 1,0,53,duration
50 NEXT duration
```

Program VI

Notice how it gives the impression of something slowing down.

So using these four parameters we can vary the notes produced by the SOUND command. Program VII does just this, using a loop to produce a series of varying notes.

```
10 REM PROGRAM VII
20 REPEAT
30 pitch=RND(255)
40 loudness=-1*RND(16)+1
50 duration=RND(255)-1
60 channel=RND(3)
70 SOUND channel,loudness, pitch
   ,duration
80 UNTIL FALSE
```

Program VII

In Program VII each of the four parameters w, x, y and z, controlling channel, loudness, pitch, and duration respectively, are set randomly. The result is "computer music", strangely soothing if listened to for a while.

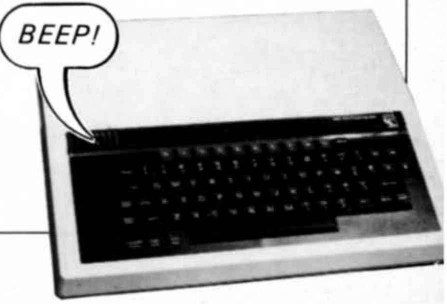
Try varying the ranges of the RND expressions to see what happens to the type of "music" produced. It's great fun, and you can learn a lot about the SOUND command by playing around.

And that's where we'll leave things for the present.

But, you might ask, what about channel 0 and playing tunes? And why haven't I mentioned ENVELOPE?

Don't worry, all this will come later. As it is, the foundations have been laid and we'll build on them in later articles.

But I must stop now. The Editor has been complaining that all these noises are keeping him awake.



THE REAL AMCOM DISC FILING SYSTEM

One of its distinct advantages against the Acorn DFS is the speed in which it handles Random Access Files (refer Benchmark figures), consequently, it can load wordwise files in approximately half the time taken by the Acorn DFS.

PRINT 1000 numbers	9.8	Move PTR 1000 places	2.9
PRINT 100 strings	56.2	Write test relative file	51.0
INPUT 1000 numbers	5.7	Read test relative file	24.2
INPUT 100 strings	22.7	Write relative file backwards	81.0
BPUT 1000 bytes	4.5	Read relative file backwards	36.0
BGET 1000 bytes	3.4		

This independent disc filing system adds greater flexibility to your BBC Computer. It has two distinct modes **which auto select** on booting the system. Mode zero is the standard mode which retains compatibility with presently available software. **Mode one, the extended mode,** allows for sixty-three file names per disc, over 100% increase on the existing DFS, and also permits the file **names to be up to fifteen** characters in length, providing much greater scope for meaningful file names. In both modes page is set at &1500. This **gives 10% more usable** memory than Acorn's DFS, in modes 0, 1 and 2. If you already have a Disc interface fitted, it is very easy to **upgrade, you simply remove** the DFS Eprom and replace it with the Amcom DFS Eprom, if not then it is possible to purchase an entire Disc inter**face kit (consists** of 11 I.C.'s) with this DFS track cutting is not required. **Also includes 8 way DIL switch to allow start up options to be set. (see** below).

Link 1 Determines if the system starts up in 40 or 80 tracks
Link 2 Select Acorn or Extended mode at start-up
Link 3 & 4 Selects type of drive ie. Shugart, Canon etc.
Link 5 Select auto-boot or not, on 'break'
Link 6-8 Select screen mode on start-up, ie. model 0 to 7 etc.

NINE NEW COMMANDS ARE NOW AVAILABLE

***Clear**	**Quickly and easily erases a entire disc**
***Format**	**Formats drive 0 to 3 in either 40 or 80 tracks**
***OPT2,n**	**Alters the number of sectors per track to n**
***OPT3,n**	**Alters the number of tracks per disc to n**
***OPT5,n**	**Sets the start of the DFS buffer (see OPT7)**
***OPT6,n**	**Provides control over which part of the file spec. will be displayed ie. only display directory and program length, or just display drive and load address.**
***OPT7,n**	**Sets the length of the DFS buffer**
***OPT8,n**	**Double steps the disc drive to allow the reading of 40 track discs on 80 track drives**
***SYS**	**Selects either Acorn mode or Extended mode Commands now include *Access**

There is a built-in formatter which will format in either forty or eighty tracks in both modes of operation. This formatter also allows for user definable parameters to be included for the development of software protection.

With this disc filing system a user definable buffer can be used while compacting the disc. This will enable disc compacting to be carried out without overwriting any programme in memory. Alternatively a new disc may be formatted without any resident programme being overwritten.

This DFS also allows for the use of wildcard characters, using either the ‡ symbol for a single wildcard and the * character for multiple wild characters. (e.g. CHAIN "P*" could be used to chain a program called PRINTER as long as there are no other files whose names begin with P).

This DFS is totally compatible with Econet etc., and is complete with a utilities disc and comprehensive manual. The utilities disc contains many useful programmes including printer screen dumps in all modes, including High Res. (Epson & NEC 8023). It also has a nibble editor to scan discs, read data, edit them, and then write back to the disc. Plus a utility to assist in the transfer of cassette files to disc.

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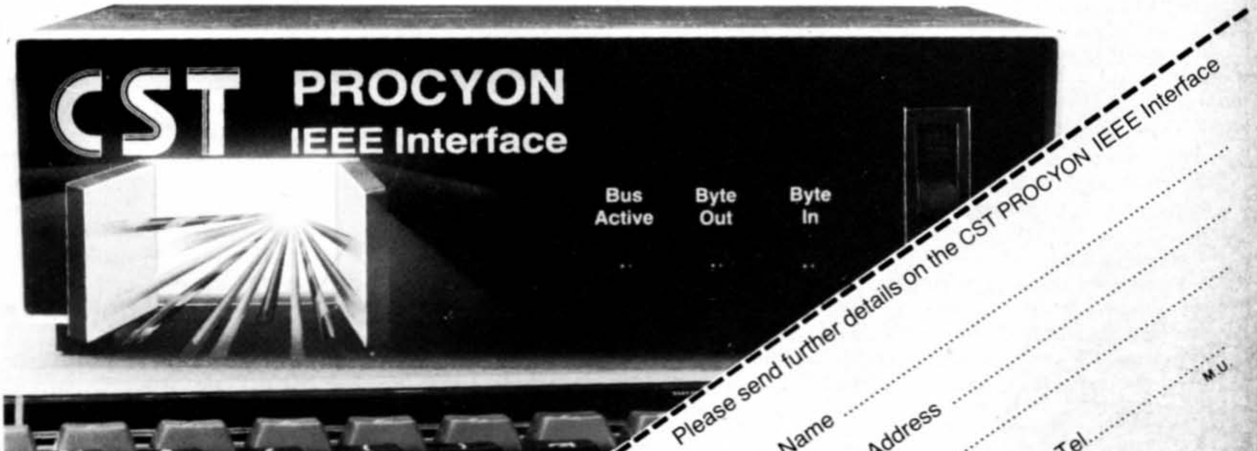

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M.U.

Spreading the workload

Spreadsheet *Microl*

BUSINESS calculations do not normally require calculations more complex than addition, subtraction, multiplication and division. However, these functions often need to be applied repetitively to large amounts of data to give the final result.

A classic example is the production of cash flow forecasts for a business in which the essence of the calculation is to take the opening bank balance as at the start of the month, add that month's estimated cash receipts and subtract the estimated payments.

This results in the month-end balance, which can be carried forward for a similar calculation to be performed the next month, and so on until the desired period (usually a year) has been covered.

Before micros this type of calculation would have been performed on a large sheet of paper ruled into columns (one for each month) and rows (one for each of the different types of income and expenditure). This is known as a spreadsheet.

The user would then begin entering the figures, adding up the columns, working out percentage increases from one month to the next and so on throughout the spreadsheet.

Apart from the tedious nature of the task, if an error had been made or it was decided to change a figure or a growth rate then all calculations subsequent to the change would have to be reworked and rechecked.

Electronic spreadsheets have taken the grind out of these tasks by providing a layout on a micro screen and allowing the machine to perform the calculations which have been defined by the user.

The Microl spreadsheet program is typical of its type, and I found it very easy to use. It comes with a comprehensive instruction manual and four samples for the user to examine and experiment with.

When run the program starts with a spreadsheet of 40 rows and 8 columns, but the manual tells the user how these dimensions can be changed up to certain limits. The columns are labelled A, B, C etc and the rows 1, 2, 3 . . .

Each space in the spreadsheet (known as a cell) can thus be referenced by the two appropriate coordinates such as B11, H9.

The cursor can be moved around the sheet by the arrow keys to rest over any of the cells, and the user can then specify what has to be done to that cell.

As it is not possible for all of the cells to be shown on the screen at once, what is displayed is a small window which can be moved about over the full area of the sheet.

Each cell could have a word or label recorded in it (typically in cells across the top and down the left hand side) to act as a description of the cells in that row or column.

Alternatively, a number can be recorded in it such as the opening bank balance, or an algebraic expression, incorporating any of the normal Basic functions, may be recorded which defines the value of that cell in terms of

A taxing problem not fully solved

Taxcalc
Consumer's Association, BBC Soft

THESE programs perform personal tax computations for the tax year 1982-83, displaying at their finish the amount of tax owed by or owed to an individual. They are accompanied by a user guide which explains some of the tax legislation involved.

The most difficult part of performing a tax calculation in practice is collecting all the relevant details and deciding the correct tax treatment of the various types of income and expenditure which a taxpayer might have.

Performing the final calculations is not usually a large computing job, and can be done quickly on a pocket calculator. These programs perform only the very final stage in a tax computation.

To take one example, if you are self-employed there can be a considerable amount of choice and skilled computation involved before arriving at a figure which can be supplied to the programs. Therefore, the programs can only be of limited help and one might be as well off with one of the many cheap manual tax guides which are published.

Taxcalc is certainly no substitute for obtaining advice from a qualified source once your tax affairs become even moderately complex.

The programs start by asking some personal details about the taxpayer and then proceed to ask a long series of questions about all the different types of income that might have been received.

Continual reference to the user guide would have to be made by anyone unskilled in the peculiar rules of our tax system so that they could decide on the correct amounts to enter. At each stage the user can correct previously entered figures and there seem to be error-trapping routines where possible.

After all the categories of income have been covered the second program is used to ask about the outgoings and personal allowances of the individual. Again reference to the user guide would be needed.

The program now has a complete picture of the user's tax affairs and the tax computations are performed. The user is given the option of seeing the effect of what is known as separate taxation of wife's earnings and can then decide whether a claim for this should be made to the Inland Revenue.

As there can be so many different patterns of income, outgoings and allowances there are almost endless permutations that were not covered by me. However, in every case that I checked, the tax computations were performed correctly.

other cells.

It is this last option which is the source of labour saving in spreadsheet programs. For example if I were using row 2 for the sales figures of month, January sales in B2, February sales in B3 and so on, I can define B3 as B2*1.01 if I expect a 1 per cent growth.

Whenever I change B2 in the future B3 will be automatically updated in the calculations so that it is always 1 per cent above B2.

Furthermore, if I thought that I would achieve a 1 per cent growth per month for the rest of the year I can use the replicate command to replicate the relationship between A2 and B2 in B2 and C2, C2 and D2 and so on all the way through. The replicate command can also be applied to numbers and labels and results in a fast setup of the spreadsheet.

There are various other commands, such as those which determine the number of decimal places to be displayed, the column width and the "sum" command which defines a pattern of cells to be added up.

A minor annoyance is that it does not seem possible to use the replicate command in conjunction with the sum command so that if replication is to be used the cells to be added up have to be defined the normal long way C3+D3 etc.

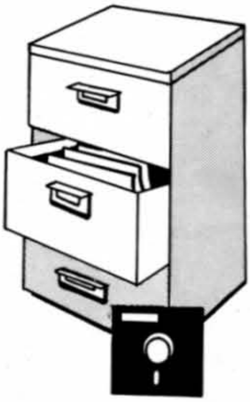
The only other annoyance I experienced is that when the screen window does not include the left hand columns or top rows, where most people would record the descriptive labels, then these labels do not appear on the screen and it can be difficult to remember which cell you want to adjust.

Once the spreadsheet has been set up the user has the capability to try out some "what if" adjustments, such as "what if expenses rise by 2.5 per cent per month?" and so on to see how sensitive the model is to the various parameters.

To conclude, a simple to use spreadsheet program offering good value for money. To test the program I set up the spreadsheet to have 13 columns and 26 rows and used all the cells available either for labels or calculations. This used up about three-quarters of the memory space available.

Therefore, the size of spreadsheet which can be created should have a wide variety of uses both in business and in the home.

Data search filed down to size



Vu-File *Psion Software*

VU-FILE is an information retrieval system which allows the user to enter, amend and delete data and to manipulate it in a wide variety of ways.

I found the program easy to use. It was accompanied by a clear user manual and an interesting example of a file containing certain details about the countries of the world.

Within the limitations, mentioned below, of the maximum file size, I thought the program impressive and a good introduction to data retrieval techniques.

To set up a file the user first defines the layout of each record and this acts as a proforma for the entering of data.

Taking the example of a file containing the membership records of a club, the layout might include surname, forenames, four address lines, post code, telephone, sex and type of membership.

Once the layout is established the user can enter the data for each member (errors can be corrected as you go along) and when the file is complete it can be saved on tape for future use.

Manipulation of the data, including the entering of new data, can only be performed when the entire file is in the computer's memory, and this imposes a restriction on the maximum size of file that can be used.

Psion quotes that 16k characters of space is available, but it can be difficult to determine how many records this represents as there can be a variable number of characters in each record.

In the club membership file mentioned above I estimated that I could have fitted about 200 records into the file. A query facility is available at any time to tell the user how much space has been used up.

When established, the file can be scanned forwards or backwards, records added, changed or deleted, and selected fields of each record printed. In addition, the order in which the file is presented can be changed by sorting it according to one or more fields.

Sorting can only be into ascending order of character codes, but may be on more than one field at once. Thus the file could be presented in ascending age order, and within that in alphabetical order of surname.

The most interesting facility offered is the ability to search for certain records. If I wanted to have a list of all the Smiths in the club the program can be made to search for those records where the surname field matches "Smith".

Furthermore, I could include the Smythes and Smarts in my list by asking the program to search for names starting with "Sm".

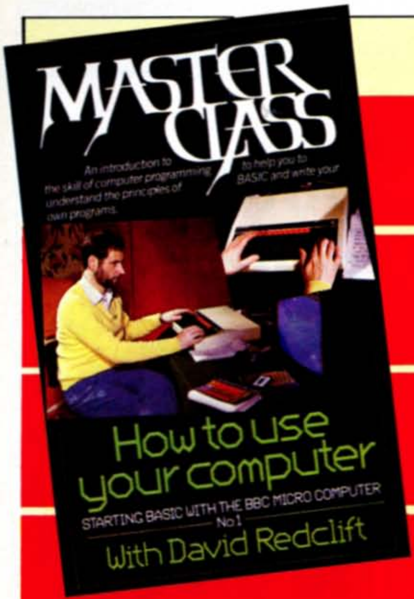
It is also possible to search for records with data ending in or containing user-defined strings or for records with data > (greater than) or < (less than) the given strings.

The search facility can be applied to more than one field at a time, and by this means it would be possible to search for all records where the person was called Smith, was over 30, and was female.

This gives what is effectively a reduced file, and the other commands can be applied selectively to the records included in it.

Reviewed by KEN GARRET

The easy way to learn more about your BBC Micro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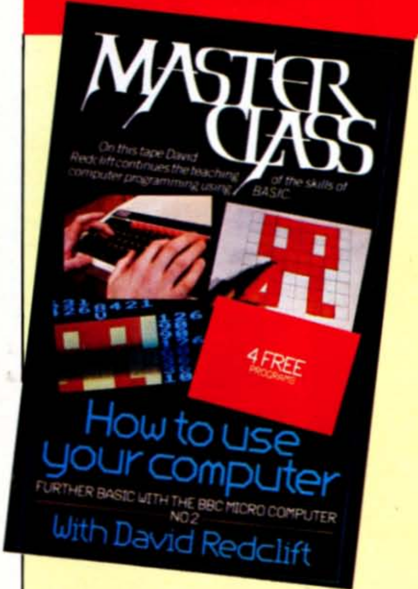
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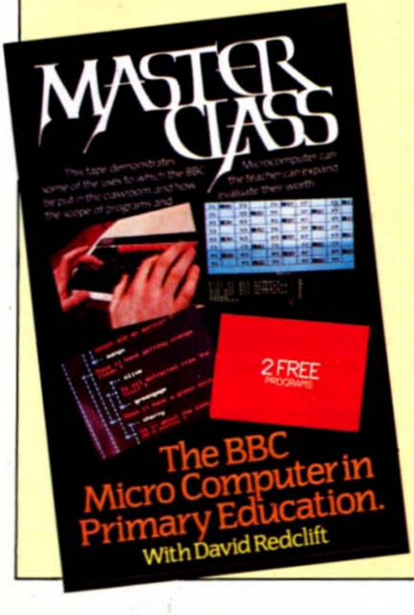
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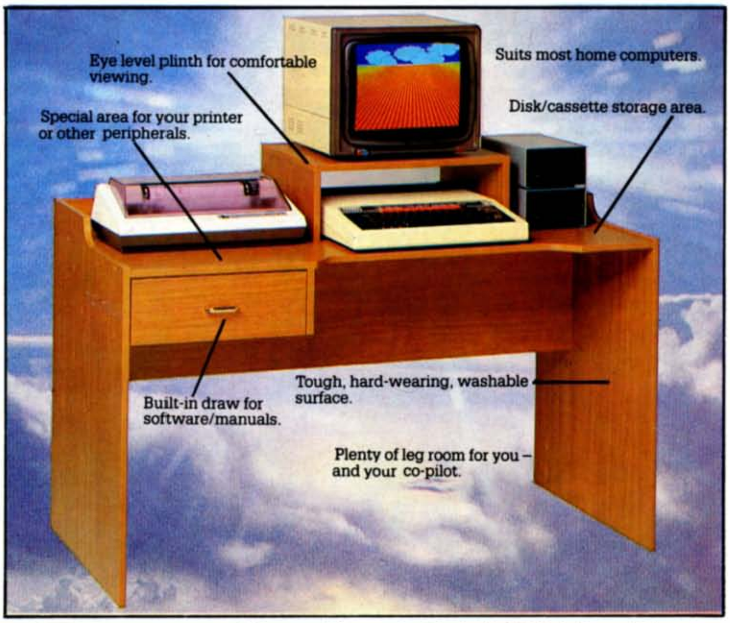
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Giant step beyond your User Guide

The Advanced User Guide
Bray, Dickens and Holmes
(Cambridge Microcomputer Centre)

THE Advanced User Guide is "designed to be an invaluable supplement to the User Guide". It is certainly that and more besides.

A lot of the information it gives has been available before in data sheets and articles, but it is useful to have it all collected together in one volume.

The large amounts of new information and insights into the operating system and hardware are an added bonus.

The book begins with an introduction to machine code for newcomers and is then divided into four major sections with 11 appendices and an index. There is even a circuit diagram tucked in the back. It is worth noting here that the excellent 12-page index makes the information easily accessible.

The first chapter, Operating System Commands, introduces, with examples, the use of *CODE and *LINE as well as filling in some other gaps left by the User Guide.

The next section is on assembly language programming. It explains the use of the Basic assembler and includes the extensions in Basic II. There are also chapters on machine code arithmetic, addressing modes and the 6502 instruction set.

Section three is titled Operating System Interfaces. It starts off well, with a full list of OSBYTE/*FX calls which includes corrections to earlier press releases. This section also includes chapters on memory usage both in RAM and OS ROM, filing sytems, interrupts, events, vectors and a most useful chapter on paged ROMs.

The text is liberally accompanied by well thought out, small examples that illustrate the concepts beautifully. Routines to read and write both from and to the cassette port are just two examples from this section.

Hardware is next and it covers all the exotica in the machine. The 6845 CRTC chapter covers fast animation and multi-direction scrolling while the video ULA chapter includes an implementation of a 10k, 16 colour mode nominated as Mode 8.

THE ADVANCED USER GUIDE
FOR THE BBC MICRO
BRAY, DICKENS & HOLMES

Interfacing is also covered well. The 1 mHz bus information comes complete with two "clean up" circuits and the 6522 chapter is most comprehensive. I was particularly interested to see in the A to D converter chapter that a fast eight bit resolution conversion can be forced.

The appendices cover about 50 pages. The first is a very useful OSBYTE summary indexed by function. This is followed by summaries of operating system calls, key values, VDU codes and plot numbers (including the OS 1.2 extras).

Appendix F has screen layouts for all the modes whilst appendix G outlines the differences in the American MOS.

Appendices H to J deal with the disc upgrade, link options on the board and the keyboard circuits. The guide ends with a small bibliography and glossary.

This book is at present the top reference work for the BBC Micro. It will be an invaluable aid to both the experienced BBC Micro programmer and to those who would like to learn more about the machine's many features.

Alan Plume

Easy reading for

The BBC Micro Book
Jim McGregor and Alan Watt
(Addison-Wesley)

HAVE you ever wondered which eight records you would choose if the BBC decided to maroon you on a desert island? What would your one luxury be? And which book would you take?

For my records, I'd take a selection of Beethoven works and for my luxury object a BBC Micro – always assuming the island had mains electricity. My book would be McGregor and Watt's "The BBC Micro Book".

It's aptly titled because it is THE book on programming the BBC Micro. It stands head and shoulders above the rest, providing an excellent introduction to Basic, sound and graphics for the intelligent beginner.

The first seven chapters of the book explore the fundamentals of BBC Basic. The authors take a structured approach right from the start and enliven the text with examples that are both practical and thought-provoking.

You have to be prepared to spend some time thinking about what they say and actually doing the exercises that are sprinkled liberally throughout the text.

Not that doing the exercises is hard work. In fact, they add to the enjoyment and value of the book by introducing new topics and expanding on issues covered in the text.

How to decipher machine code

Discovering BBC Machine Code
A.P. Stephenson
(Granada)

BEFORE I read Discovering BBC Machine Code I knew almost nothing about the subject. After finishing it I had tackled all the basics and felt I understood them thoroughly.

But I don't think that I've gained this knowledge in quite the manner the author intended.

The aim of the book is to provide a simple, "softly-softly" approach to using the BBC Micro's assembler. The exercises are deliberately kept easy in order to encourage experimentation (they do!). Also some of the more difficult topics are left until a promised companion volume.

The result of all this should have been an easy to use book leading to an elementary command of BBC machine code. It should have been; it almost is; but it isn't.

What is annoying is that as you read the book you can tell that with a little more time and effort it could have been excellent. As it is, it gives the impression of having been rushed in order to get it to the printers.

The idea of limiting the range of subjects covered is a good one and works well enough. The trouble is that the levels of explanation vary quite considerably.

You'll be reading page after page of easy-to-grasp treatment of fairly complex topics and then suddenly come across something that pulls you up abruptly.

The rather brusque treatment of two's complement and the C and V bits of the PSR are cases in point.

After a bit of mental effort and toil on the micro it eventually becomes clear, but it does dent your confidence.

You start to think that maybe the parts that you found easy were only easy because you hadn't understood them properly in the first place.

And for a book that aims at a softly-softly approach these sudden lurches in the level of difficulty are anything but encouraging.

What is worse, however, is the number of errors that seem to have crept into the book. Is 32 decimal really 23 in hexadecimal? Page 56 would have you believing that.

And is the operation code for "load some data into the accumulator" really 8D as it says in its explanation of the very first machine code routine you run?

These mistakes are easy enough to spot but they do harm your confidence. And if a complete beginner like myself can spot them why couldn't the author?

Also is it true that "if we use BNE the branch will take place only if the Z-bit is 1"? Surely that's the complete opposite of what happens?

I spent ages agonising over that one, and still have my doubts.

The mistakes could easily have been avoided and the level of difficulty kept to a more even standard. I found it irritating and frustrating.

And yet I also found it engrossing, easy to follow (apart from the difficult bits!) and I would recommend it wholeheartedly, warts and all.

No, I haven't done a U-turn. Or gone out of my mind. All my criticisms and misgivings about the book still hold.

Yet I read it to learn the elements of machine code and these I have learned.

Sadly, most of my understanding came from trying to sort out the obscurities and the mistakes. The title, Discovering BBC Micro Machine Code, is all too apt.

Even so, it was my understanding of the good bits (which make up most of the book) that gave me the confidence to attack the rest.

I really was a complete beginner and if I now know enough to pick up the author's mistakes it's his own fault. After all, he's the one who taught me . . .

So if you are a complete novice who wants to learn about BBC machine code and you're prepared to expend a little mental effort on the more difficult parts then this is the book for you.

By the time you've read and understood (I nearly added "solved") it you will have a firm grounding in machine code.

And when you have that maybe you could explain to me one thing that I haven't figured out.

What on earth are the op-codes PSH and PSA?

I can't find them in the 6502 instruction set.

It's the little mysteries like this that make the book a joy.

Tom Stepping

---

a desert island

After this thorough grounding in basic Basic, the authors go on to explore the BBC's sound and graphics capabilities, showing the same expertise as in the earlier sections. The chapter on sound is probably the best I've come across (if a little academic) and the ones on graphics are of the same quality.

By the time you've finished reading the book and working your way through the exercises, you'll be a minor expert on using the BBC Micro. You'll also be able to create animated characters and play quite complex tunes to accompany them. And you'll be doing it in a logical, structured manner.

The only reservation I have is that an absolute beginner may find the pace a little difficult and some of the early exercises daunting. Having said that, though, the book is so lucidly written that anyone willing to actually spend time thinking will have few problems.

For those who wish to go further, there is a second book by the same authors called "Advanced Programming for the BBC Micro". I'm told that this is the book they originally wanted to write but the publishers demanded an introductory book first.

If this is true, then we owe them a great deal because McGregor and Watt's book has set the standard for books about the BBC Micro. Thoroughly recommended.

Pete Bibby

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THERE will come a point in your development as a programmer when you will have mastered the use of much of BBC Basic. You will then be in a position to concentrate on writing more adventurous programs. Tim Hartnell, author of "Let Your BBC Micro Teach You to Program", and co-author of "The Book of Listings" and "Games BBC Micros Play", discusses some ideas which should help you create better programs.

Now that basically programming with

By TIM HARTNELL

YOUR programs should work after relatively little debugging. They should be easy for others to understand and to operate, and should ideally be written logically and elegantly. Some hints on how you can approach the achievement of these ideal aims are outlined in this article.

Your programs will be more likely to run first time if they are planned out carefully *before* you start entering code (or program) into your computer. A good way to start is to use a diagram which is called a flowchart.

A flowchart is a series of boxes and other shapes, joined by lines, which show the flow of action and decision-making within the computer while the program is running.

The shapes you use are not too important, and I suggest you stick to just two: a rectangle for most actions the computer must carry out, and a diamond shape each time the computer has to make a decision.

The corners of the diamond can be used – as you can see in Figure I below to cater for the alternatives facing the computer.

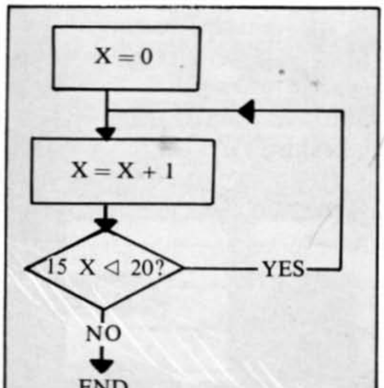


Figure I

This diagram shows a sample flow chart, which sets a variable X equal to zero, then adds one to it. The value of X is then checked.

If X is found to be less than 20, the program goes back to add one to X again. This continues until the value of X equals 20.

One advantage of using a flowchart is that you do not get locked into the pecularities of BBC Basic at an early stage of your work. Instead, you can concentrate on what you want to *do,* rather than the way in which you will do it. You do not have to bend to any limitations of your Basic at the start of the process.

A flowchart is, or should be, universal. That is, the same flowchart should be suitable for use as the basis of a program written on any computer at all.

A flowchart models the flow of action and logic within a program, and is therefore very useful for picking up bugs at the earliest stages.

You may, for example, find that one condition for which the program will test will never be fulfilled, possibly leading to the program being trapped in an infinite loop.

Other parts of the code may be bypassed completely, because the condition which triggers entry into that part of the code will never be met.

Once you've devised a flowchart for your program, and you've run through it mentally a few times so that the most obvious bugs are removed, you should reduce the chart to a series of subroutine, or procedure, calls.

Although it seems pretty silly to do this for a simple program like our "SET X EQUAL TO ZERO, ADD ONE, CHECK IF IT'S LESS THAN 20" program, this method comes into its own with complex programs.

You start the program with a series of subroutine or procedure calls, with each action of the program being looked after by a separate subroutine or procedure. Personally I prefer the use of procedures, but you can stick with subroutines if you like.

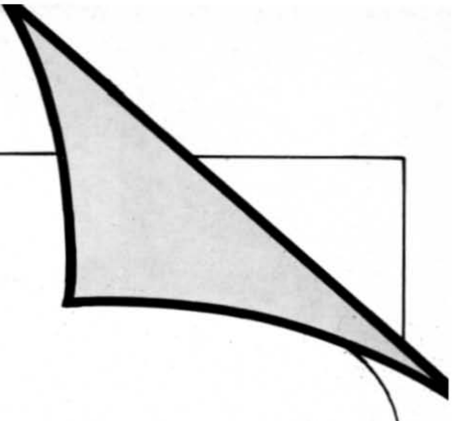
Procedures are actioned quickly, and can have explicit names (such as PROCadd_to_score) which make it easy to follow the program through.

If the steps within a program have to be performed several times in a particular sequence, the series of procedure calls can be made within a master REPEAT ... UNTIL loop, until the specified condition is met to terminate the cycle.

You'll recognise how useful this approach to programming can be when you get to the debugging stage of your program. If there is a bug within the program, it is likely to be within a single subroutine or procedure.

It is relatively easy to track down the offending procedure, and find the bug. This is much simpler than having to work right through the program.

Working with procedure "modules" in this way allows you to test sections of the program in isolation, even before the entire program is finished. I'll try to make this statement clear by showing



you are sound, try a touch of elegance...

you the first part of a typical program to play draughts.

The program could start like this:

```
10 REM DRAUGHTS
20 PROCinitialise_variables
30 REPEAT
40 PROCprint_board
50 PROCaccept_player_move
60 PROCprint_board
70 PROCmake_computer_move
80 UNTIL (human wins or computer wins)
90 IF (human wins) PRINT "YOU WIN"
100 IF (computer wins) PRINT "I WIN"
110 END
```

You could get quite a bit of this program running, and tested – such as the initialisation routine, printing the board and accepting the player's move – before you even turned your attention to how on earth you were going to get the BBC Micro to make its move.

You would then know, for example, that you would not need to waste any extra thought on whether or not an error in the board-printing procedure was the cause of odd output.

Having tested the board subroutine, and the player move routine, you'd know that the error must lie within the "make_computer_move_" procedure.

All you need to do is put a single PRINT statement, such as "THIS IS THE COMPUTER MAKING A MOVE", followed by ENDPROC, for incomplete routines, knowing that the computer will demonstrate the direction the program flow is following, even if whole sections of code have not yet been written.

I suggest you try and do as much writing of the program as possible *before* you turn the computer on, even though there is a great temptation to dive straight into the computer and start punching in code.

You'll find that the discipline of writing it out by hand in advance will serve you in good stead and should, in the long run, produce a better program than might otherwise have been the case.

Overall, you'll probably end up

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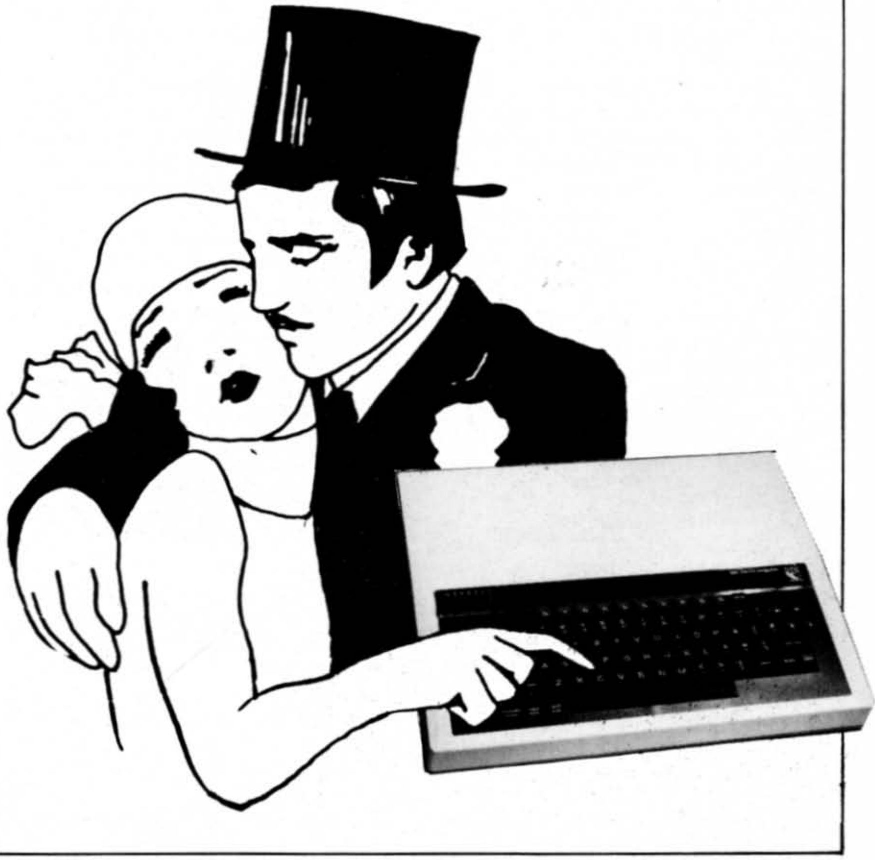

From Page 89

spending less time on the program working in this way than you would if you began the process sitting at the BBC Micro keyboard.

It took me a while to learn this lesson. Although I had read suggestions along the lines of "work out exactly what you're going to enter before you start at the computer" in several books, I tended to just jump right in without much prior thought.

Although I worked out rough flowcharts, and had an idea what sort of display organisation I wanted, I certainly did not write much program out on paper before starting at the computer.

Then I found myself stuck for a two-week period without a computer (oh, horrid thought) and the ideas for several programs, including my first chess program, just itching to be written.

The coastal village of Saundersfoot in Wales is not well supplied with computer retailers, so I had to do the best I could, without a computer.

I started writing the programs in an exercise book. The relative ease with which the programs were debugged when they were eventually entered into the computer on my return to London, and the complexity of the programs I wrote in this way, convinced me that this was the way I would work from then on.

It is amazing how much cleaner a program can be if all the rough working is done on paper, rather than on the computer screen.

At present I tend to write the major procedure calls "loop", as I've described, before I do any programming at all, whether on paper or on the computer. Next, I write each "module" (or procedure/subroutine) on a separate sheet of paper.

Then, when the major modules have been written, I shuffle them into an order which seems most logical. All this, of course, occurs before any line numbers are written in.

The modules are put in an order which ensures the program structure is as logical, and easy to follow, as possible.

I use arrows to indicate the destination of GOTOs and GOSUBs (if I cannot avoid using them) within a module. Later on, when the program has assumed a firm shape, the lines are numbered (in tens, starting at 10) and the relevant GOTO and GOSUB destinations added.

The entire program is renumbered before finally saving, or dumping to the printer.

All programs have an "end condition", at which point computation stops. The test for this should ideally be an "UNTIL" at the end of a master REPEAT ... UNTIL loop.

This ensures that the cycle will continue until a particular condition is met, at which point the program will "fall through" to the section which signals the end of the program.

In this article I've discussed the value of using flow charts, the use of a master REPEAT ... UNTIL loop, and the importance of writing out a program on paper before starting to enter code into your BBC Micro. A final suggestion regards the use of documentation.

The word documentation refers to the written material which accompanies a program. It is useful for a program to be supported by documentation, no matter how sketchy it is.

The written information should explain, of course, what the program does, then go on to outline the flow of action within the program.

The documentation should alert the user as to the kind of actions which will be required from him or her when running the program, and give an indication of the kinds of user input and reaction which will be accepted.

The format of the final output should be discussed. A list of variable names could also be included.

If there are ways in which the program can be further developed, extended or improved, suggestions along these lines can be added to the documentation.

Written references to any material which will help in understanding the algorithms used, or giving suggested areas for program development, should also be included.

In many ways it is reasonable to assume that the job of programming is not finished once the program is done. Without documentation the job is only three-quarters complete.

Documentation finishes the task, adding a professional stamp to your work which allows the program you've written to be used most effectively.

Possibly the only time when extensive documentation is not really required is when the program is "menu driven", and the choices offered to the user are so clear, with detailed input prompts, that they lead the user through the program without much chance of misunderstanding.

A program which uses REM statements extensively may not need very much in the way of documentation, especially if you include a variables list, as a series of REM statements, at the end of the program.

Generally, however, you'll find it better to document a program externally, rather than rely on REM statements or the various menu choices to do the job for you.

It is worth trying to write your program documentation so that it would make sense to someone who had not seen the program running.

They should get a very good idea from reading the documentation what the program does and how it does it, how it interacts with the user both in terms of accepting information and in presenting the results of its computations to the user, and how the program is organised as a whole.

Documentation for a major program should start with an introduction which explains quickly what is going on, and how the program can be used. The later parts of the documentation can then discuss the program in greater detail.

It is not good practice to force the user to wade through a vast amount of information in order to dig out the vital facts he or she needs to get the program running.

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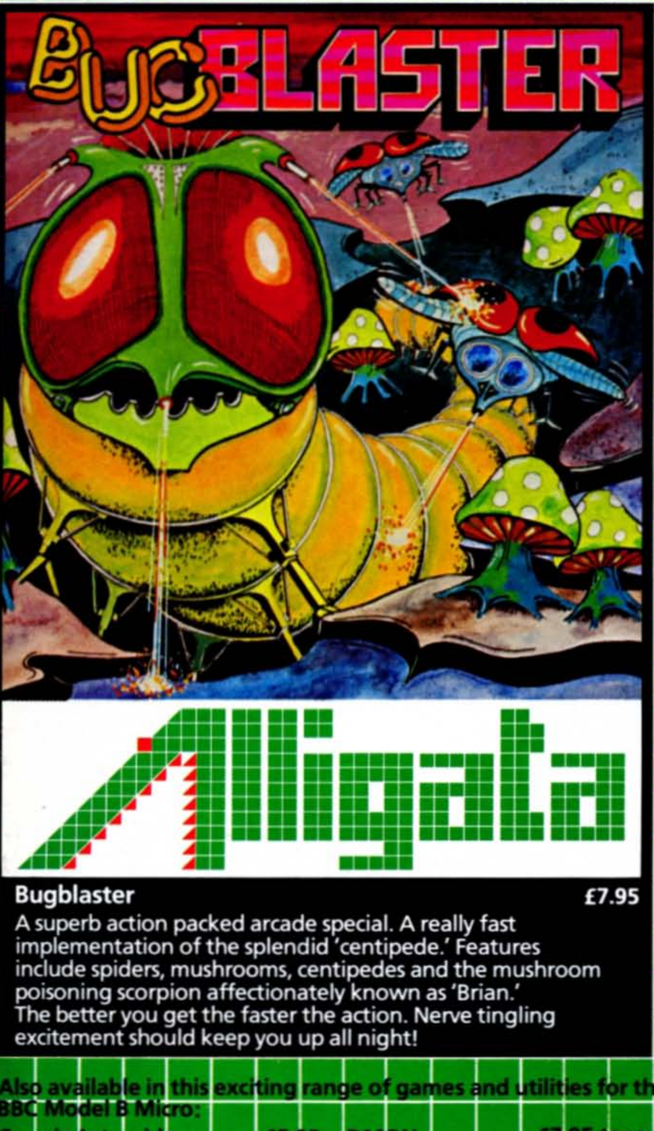

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SOFTWARE WITH BITE

BBC MICRO USER
Deathwatch
and 24 other programs listed in the pages of BBC Micro User Vol. 1, No. 1.

March Issue

DEATHWATCH, a superb arcade game that challenges you to use your skill to fight off enemy battleships, tanks and helicopters; **BINGO**, illustrating clever uses of the randomise function; **BUBBLESORT** routines; **TESTS** for function keys in machine code routines; a useful **CASSETTE BUGS FIX** for users with OS 0.1 . . and many **COLOUR** and **GRAPHICS ROUTINES** to help you create a kaleidoscope of screen designs which you can incorporate into your own programs.

BBC MICRO USER
KING KONG
and 22 other programs listed in the pages of BBC Micro User Vol. 1, No. 2.

April Issue

KING KONG, a fast moving game in which you pilot a helicopter to rescue girls perched on the Empire State Building before killing Kong; **GRAPHICS**, a suite of colourful demonstration programs; **NIM**, a structural game of strategy; **TOKENS**, first steps in unravelling the Basic ROM; **HOROSCOPES**, a fun program with useful error-trapping routines; **FORMATTER**, an essential disc utility; **DISASSEM**, a full machine code disassembler; **HEAT & LIGHT**, two measuring and plotting programs.

BBC MICRO USER
AIR STRIKE!
32K
and 33 other programs listed in the pages of BBC Micro User Vol. 1, No. 3

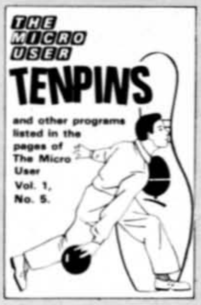
May Issue

AIR STRIKE, a fast and furious arcade game; Test your mental powers with **PELMANISM**; 25 **ANAGRAMS**, an entertaining word game for you to play; **CHARACTER**, to generate vertical and inverted text; **TELETEXT**, animation in Mode 7, really brings the screen to life; **LAB**, a trio of programs to interface laboratory equipment; 10 programs to investigate the **OSBYTE** routine; **BEEB**, two joystick exercises; plus more **COLOUR** and **GRAPHICS** routines.

THE MICRO USER
SPACE PILOT
and other programs listed in the pages of BBC Micro User Vol. 1, No. 4.

June Issue

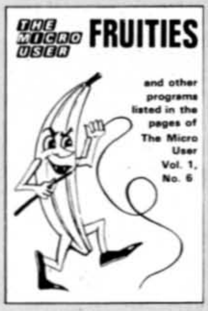
SPACE PILOT, lost in space with dwindling fuel supplies, you must fight off repeated attacks from alien life forms. To replenish fuel, you have to perform a tricky docking manoeuvre, while to repair the inevitable damage you must land on a mountainous planet. **NOMISM**, you are a nomadic herdsman desperately trying to eke out a living on the plains of Africa. Can you survive drought, tsetse fly and other hazards? **COLOURFUL CHARACTERS PLUS** other listings from the June issue.


THE MICRO USER
TENPINS
and other programs listed in the pages of The Micro User Vol. 1, No. 5.

July Issue

TENPIN, a highly entertaining simulation of Tenpin Bowling; **SPACEPODS**, Try to beat alien hordes; **CUP**, Exciting techniques to bring 3D graphics to the BBC Micro; **SCRSAVE** and **CSRLOAD**, Two programs to allow you to save and load screens to tape or disc; **TEST** and **STEADY**, A pair of programs to accompany the Beeb Body Building Course; **BREAKFIX**, Don't let the Break key destroy all your precious variables! **FORMAT**, Create neater listings with this invaluable utility.

We've got it all taped!


THE MICRO USER FRUITIES
and other programs listed in the pages of The Micro User Vol. 1, No. 6

August Issue

FRUITIES, driven by strange urges you climb the ladders of adventure to risk all in the gardens of unearthly frights. Can you survive all the terrors that await you, or will you, too, fall victim to the evil Fruities? A really superb game. **ANIMATION**, a suite of programs that show you how to really bring your screen alive; **CASDISC**, The essential machine code downloader for your disc system; **MODE 7** colour routines to bring yor screen to life. **PLUS** other listings from the August issue.

THE MICRO USER
Robin and Marian
and other programs listed in the pages of The Micro User Vol. 1, No. 7

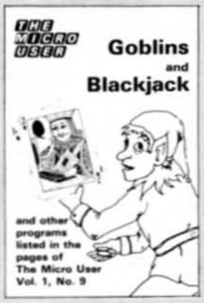
September Issue

ROBIN & MARIAN, a highly-challenging game in which you play the part of Robin Hood rescuing Maid Marian from the clutches of the Sheriff of Nottingham. **GALACTIC INVADERS**, an extremely well-written cross between two well-known arcade games. **DFS BENCHMARKS**, 14 programs to test out disc filing systems. **ANIMATION**, four programs to teach new techniques. **Terminal**, three programs to connect a BBC Micro to a mainframe. **PLUS** other listings from the September issue.

THE MICRO USER
GONE FISHIN'
and other programs listed in the pages of The Micro User Vol. 1, No. 8

October Issue

FISHING, a compulsive simulation of a day's angling. **JOYKEY**, to convert your programs to joystick control. **PENTEST**, tests the Micro User light pen, and **BELLRINGER**, an amusing and musical way to use it. **CONTOURS**, an educational program with many uses. **LINKs**, two superb pieces of software to let BBC Micros talk to each other. **CHESS**, the winning entry in our June contest. **PLUS** six other programs from the pages of The Micro User, and all the listings from the first issue of Electron User.


THE MICRO USER
Goblins and Blackjack
and other programs listed in the pages of The Micro User Vol. 1, No. 9

November Issue

GOBLINS, a journey through an enchanted forest. **BLACKJACK**, a recreation of the casino favourite. **CHARGE** and **PENDULUM**, two ingenious programs from Body Building Course part 9. **SIDEWAYS**: to store programs in sideways ROMs. **PENDRAW**, a light pen sketching program. **SOUNDs**, seven programs illustrating the excellent sound of the BBC Micro. **TUTORIAL**, listings from part 7 of our beginners' series **PLUS** all the programs from the second issue of Electron User.

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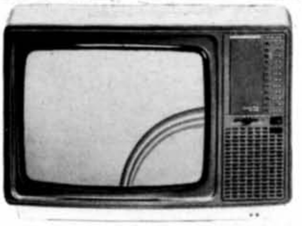

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BBC MICRO USER

March issue
Beginners: guide to the keyboard. Build your own games paddle. Alphabeta word processor review. Guide to text colours and graphics. BBC operating system, Part 1. How to avoid cassette loading problems. Deathwatch listing. Upgrade Model A to B at half the shop price. Shapes program. Bingo listing. Sorting routines. Test for function keys in machine code routines. Colour monitor review, Part 1.

BBC MICRO USER
KILL KONG!

April issue
Beginners: simple programming techniques. Produce impressive graphics with Teletext Mode 7. Common copying errors revealed. How to draw multi-coloured lines. King Kong listing. BBC Operating System, Part 2. Colour monitor review, Part 2. Upgrade Model A to B, Part 2. Finding the ROM's action addresses. Binary code and how to use it. Disc formatter listing. Plus 8-page pullout: essential reference guide for Basic programmers.

BBC MICRO USER
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JUMPIN' KANGAROOS!
AIR STRIKE!

May issue
Beginners: string variables. Pelmanism listing. Mode 7 animation, Part 2. Interfacing in the laboratory. How to generate vertical or even inverse text. Graphics course: triangles and rectangles. Build yourself a joystick. The Osbyte routine: full investigation. Air Strike listing. Anagrams listing. Structured programming, Part 1. How to make full use of the BBC's editing function. Medprom eprom programmer review.

THE MICRO USER
WIN

June issue
Beginners. Use of the INPUT statement. Editing course: LIST and LISTO. BBC speech chip review. Structured programming. Part 2. Solving cassette problems. Build your own graphics digitiser. Hidden *FX calls. Guide to indirection operators. Single key memory display program. Space Pilot listings. Graphics course: text and graphics windows. Nomsim listing. Bringing user defined characters to life. Guide to Software for the BBC Micro.

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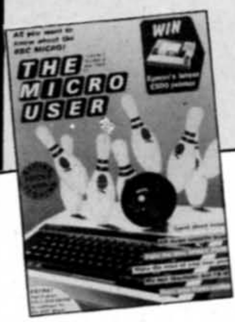


July issue
Beginners: loops. Ten Pins listing. Editing course: the PRINT statement. Graphics course: creating sunburst effects. Structured programming, Part 3. How to use the user port to maximum effect. Space Pods listing. Wordwise review. Epson FX80 printer review. The BBC Micro as a sophisticated design tool. Hexadecimal highlights. How to edit with impunity, and fix that break key. Guide to Software for the BBC Micro.

WIN
THE MICRO USER
TALKING TURTLES!

August issue
Beginners: more help on loops. BBC Micro User's Manchester show reviewed. Animation, Part 1. BBC Buggy and Edinburgh Turtle reviewed. Easy techniques for switching from tape to disc. Structured programming, Part 4. Inside King Kong: case study of the popular game. Fruities listing. A guide to logical operators. Machine code routines to give Mode 7 colour. Build your own dual cassette system. Guide to Software for the BBC Micro.

THE MICRO USER
Robin to the rescue

September issue
Animation Part 2. Editing course: use of the TAB statement. Turn your BBC Micro into a graphics terminal. Galactic Invaders listing. Structured programming, Part 5. Two new DFS and APTL Eprom blower reviewed. Control the outside world safely with your BBC Micro. Robin and Marian listing. Workshop: variable storage explained. Beebcalc investigated. Inside the Electron. Guide to Software for the BBC Micro.

electron user
THE MICRO USER
INSIDE!
Gone Fishin'

October Issue
Graphics: How to draw circles. Fishing, the listing of our latest game. Structure, the last of the series. Format: We update the program. Make a light pen with Body Building Part 8. Editing: Print fields and spaces. The Hobbit reviewed. Workshop: Add joysticks to your games. Link Up: Join two BBC Micros. FOR ... NEXT loops in Beginners' Part 7. Contour plotting program. Basicode, a computer communications language.

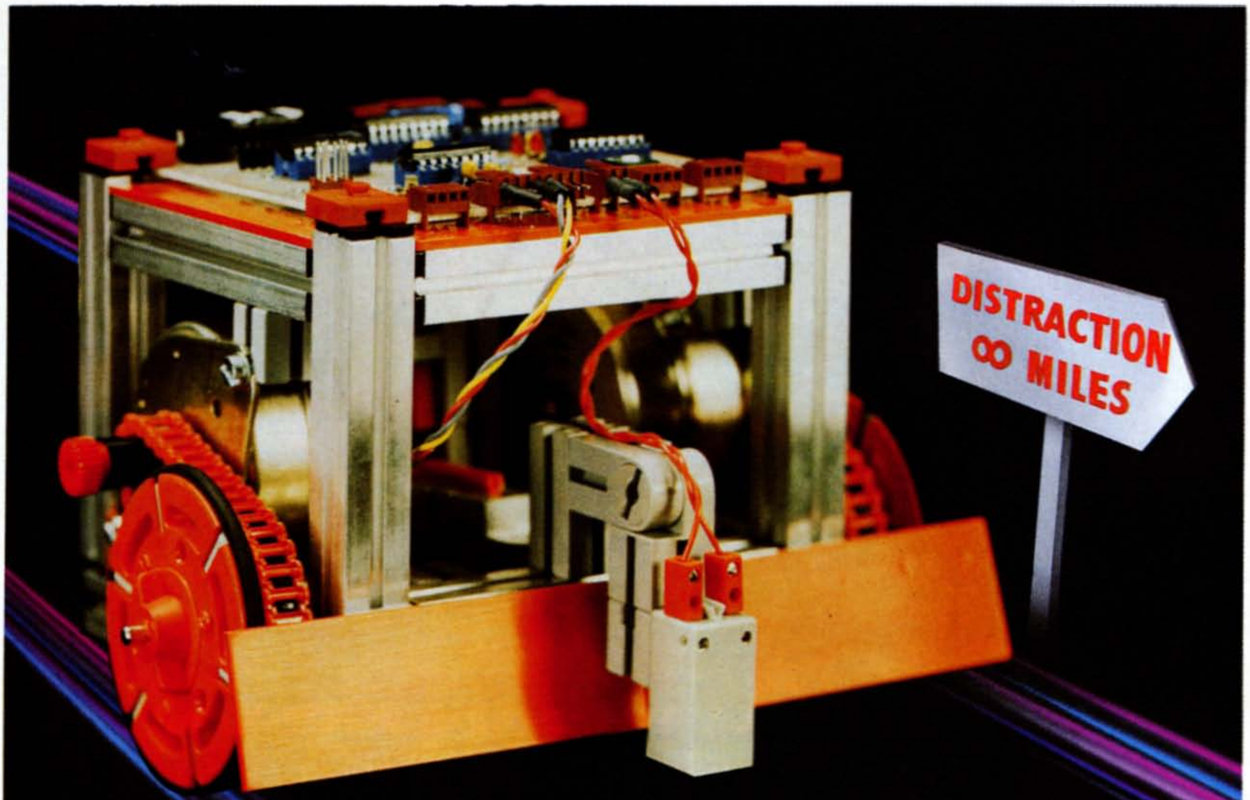
Light Pen listing

From Page 35

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

```
10 MODE 7
20 PROC_INTRO
30 PROC_PINT
40 Y=0
   :X=0
50 PENOLD=0
   :CPOS=0
   :BPOS=0
60 MODE 2
70 VDU 28,0,31,1,0
80 VDU 24,128;0;1279;1023;
90 VDU 23,224,255,255,255,255,255,25
   5,255,255
100 VDU 23,226,0,0,28,28,28,0,0,0
110 VDU 23,227,56,124,124,124,124,124
   ,124,56
120 VDU 23,228,145,82,52,31,248,44,74
   ,137
130 VDU 23,229,0,42,0,42,0,42,0,0
140 VDU 23,230,128,64,32,16,8,4,2,1
150 VDU 23,231,255,129,129,129,129,12
   9,129,255
160 PROC_PALLET
170 VDU 5
180 GCOL 0,2
190 VDU 19,0,7;0;
200 VDU 19,7,0;0;
210 PROC_SELECT(864)
220 PROC_SELECT(448)
230 PROC_DOWN
240 IF X<65
   THEN PROC_SELECT(YPEN)
   :GOTO 230
250 IF X<128
   THEN GOTO 230
260 TIME =0
270 REPEAT
280 PROC_PGET
290 IF XPEN<128
   THEN TIME =50
   :GOTO 330
300 MOVE X,Y
310 PRINT BRUSH$;
320 IF PEN<>PENOLD
   THEN PENOLD=PEN
   :TIME =0
330 UNTIL TIME >15
340 GOTO 230
350 DEF PROC_PALLET
360 CLS
370 COLOUR 135
380 PRINT
390 FOR A=0 TO 7
400 COLOUR 0
410 PRINT CHR$ (224);
420 COLOUR A
430 PRINT CHR$ (224);"  ";
440 NEXT
450 PRINT
460 COLOUR 0
470 FOR A%=226 TO 231
480 PRINT CHR$ (224);
490 PRINT CHR$ (A%);"  ";
500 NEXT
510 ENDPROC
520 DEF PROC_SELECT(YVAL)
530 YVAL=32-(YVAL DIV 32)
540 IF YVAL<1
   THEN ENDPROC
550 VDU 4
560 IF YVAL>16
   THEN 650
570 PRINT TAB(0,CPOS);CHR$ (224);
580 CPOS=(YVAL DIV 2)*2+1
590 NCOL=(YVAL-1) DIV 2
600 IF INKEY (-1)
   THEN NCOL=NCOL+8
610 GCOL 0,NCOL
620 PRINT TAB(0,CPOS);"+";
630 VDU 5
640 ENDPROC
650 IF YVAL<18 OR YVAL>29
   THEN GOTO 700
660 PRINT TAB(0,BPOS);CHR$ (224);
670 BPOS=(YVAL DIV 2)*2
680 PRINT TAB(0,BPOS);"*";
690 BRUSH$=CHR$ (226+((BPOS-18)
   DIV 2))
700 VDU 5
710 ENDPROC
720 DEF PROC_DOWN
730 REPEAT
740 IF INKEY (-99)
   THEN CLG
750 A%=ADVAL (1) DIV 64
760 UNTIL (A%>100 AND A%<800)
770 PROC_PGET
780 X=XPEN
790 Y=YPEN
800 ENDPROC
810 DEF PROC_INTRO
820 PRINT
   :PRINT
830 PRINT SPC (10);"LIGHT-PEN SKETCH
   PAD"
840 PRINT SPC (12);"By Mike Cook"
850 PRINT
   :PRINT
860 PRINT "SELECT THE INK (WHITE
   TO BLACK)"
870 PRINT "SELECT YOUR BRUSH (FROM
   5)"
880 PRINT "    By USING THE LIGHT-PEN
   "
890 PRINT
   :PRINT
900 PRINT "HOLD DOWN SPACE BAR TO
   CLEAR"
910 PRINT "HOLD DOWN SHIFT WHILE
   SELECTING COLOURS"
920 PRINT "            TO OBTAIN FLASHI
   NG COLOURS"
930 PRINT
   :PRINT
940 PRINT "PRESS ANY KEY TO START"
950 A=GET
960 ENDPROC
970 DEF PROC_PINT
980 DIM GRAB% 18
990 P%=GRAB%
1000 [
1010 LDX £16
1020 LDA £17
1030 STX &FE00
   :LDX &FE01
1040 STA &FE00
   :LDA &FE01
1050 RTS
1060 ]
1070 ENDPROC
1080 DEF PROC_PGET
1090 *FX 19
1100 PEN=(USR (GRAB%) AND &FFFF)-1545
1110 YPEN=INT ((32-PEN DIV 80)*32)
1120 XPEN=INT ((PEN MOD 80)*16)
1130 Y=Y-((Y-YPEN) DIV 4)
1140 X=X-((X-XPEN) DIV 4)
1150 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 101.



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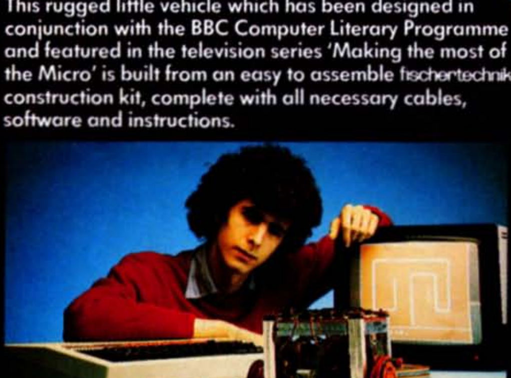

The Buggy's software which is based on the 'building block' principle consists of 12 robust application programs and one familiarisation program all of which feature full graphics.

Take a trip into the future without ever leaving your key-board – drive a BBC Buggy.

PROGRAMS

Test and familiarisation.
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Routeplanner – advanced version of Snail.
Recorder – route display.
Snail – screen route planning.
Explore for wall – mapping of boundaries.
Explore for object – seeks objects, defines shapes, returns home.
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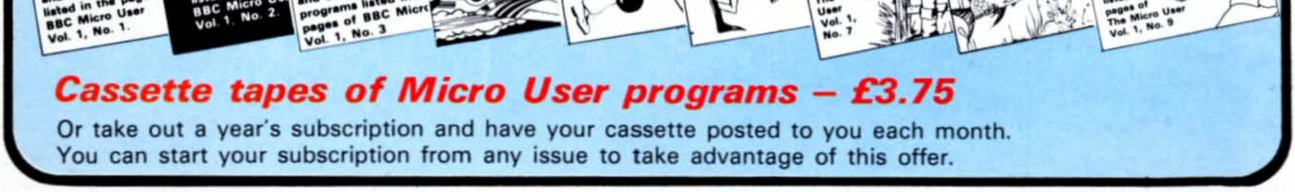
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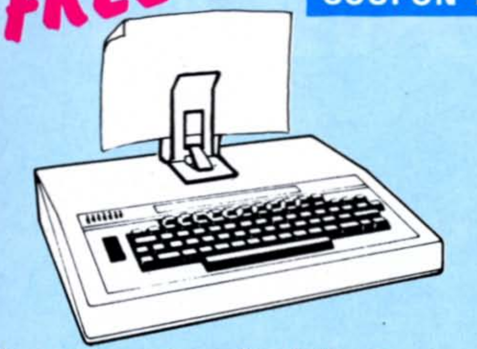

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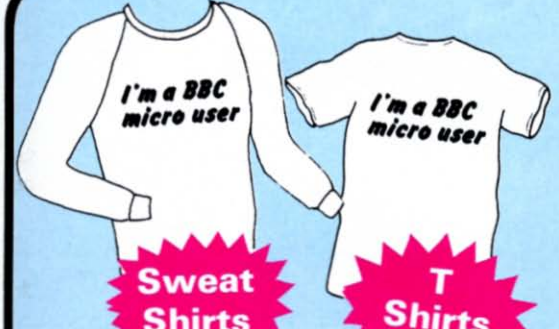

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Blackjack listing

From Page 49

```
    CHR$ 157:CHR$ 131;CHR$ 141:"BLACK
    JACK    ":CHR$ 156
    :NEXT I%
430 PRINT TAB(6,15);CHR$ 129:"Can
     you beat the Bank"'CHR$ 129:
    "     in this game of chance?"
440 PROCpause(400)
    :CLS
450 PRINT TAB(1,6)CHR$ 134;"Please
     type name of FIRST PLAYER"
    CHR$ 134:" and press RETURN ":
    CHR$ 135:
460 Name$(1)=FNinput(8,"S")
    :CLS
470 PRINT TAB(1,9)CHR$ 131:"Please
     type name of SECOND PLAYER"
    CHR$ 131:" and press RETURN ":
    CHR$ 135:
480 Name$(2)=FNinput(8,"S")
490 ENDPROC
500 DEF PROCmain
510 VDU 23;10,32;0;0;0:
520 REPEAT
530 VDU 19,1,4:0:19,2,5:0:
540 Nscore%(1)=10
    :Nscore%(2)=10
    :Owe%(1)=0
    :Owe%(2)=0
    :N%=0
550 REPEAT
560 PROCclear
570 PROCheader
580 PROCshuffle
590 PROCstake
600 FOR I%=1TO 6
    :PROCdeal
    :NEXT I%
610 PROCname
620 IF NBflag%
    THEN 650
630 PROCbank
640 PROCcheck
650 PROCwin
660 UNTIL (Nscore%(1)>99 OR Nscore%(2
    )>99) OR (Owe%(1)>0 AND Nscore%(1
    )=0 AND Owe%(2)>0 AND Nscore%(2)=
    0)
670 CLS
    :VDU 19,2,10:0:
680 FOR I%=1TO 2
690 IF I%=1
    THEN y%=10
    ELSE y%=15
700 IF Owe%(I%)>0
    THEN PROCline(Name$(I%)+"'S debt"
    ,y%,3)
    :PROCline("to the Bank is "+
    CHR$ 17+CHR$ 1+"£"+STR$ (Owe%(I%)
    ),y%+2,3)
710 NEXT I%
720 IF Owe%(1)>0 AND Owe%(2)>0
    THEN PROCline("NO MORE CREDIT!"
    ,6,2)
    :GOTO 760
730 PROCcredit
740 IF Nscore%(1)>99
    THEN N$=Name$(1)
    ELSE N$=Name$(2)
750 PROCline(N$+" has broken",19
    ,2)
    :PROCline("the Bank!",21,2)
760 PROCline("ANOTHER GAME (Y/N)?"
    ,25,3)
770 REPEAT
780 G%=GET AND 223
790 UNTIL G%=78 OR G%=89
800 CLS
810 UNTIL G%=78
820 ENDPROC
830 DEF PROCshuffle
840 IF N%=0 OR N%>89
    THEN N%=0
    ELSE ENDPROC
850 FOR Z%=1TO 104
    :A%(Z%)=0
    :NEXT
860 PROCline("* SHUFFLING CARDS *"
    ,30,2)
    :RESTORE 3160
    :PROCsound(5)
870 X=RND(-TIME )
880 FOR I%=1TO 2
    :FOR S%=1TO 4
    :FOR T%=1TO 13
890 B%=RND(104)
900 IF A%(B%)=0
    THEN A%(B%)=T%
    :ST%(B%)=S%
    :GOTO 930
910 IF B%=104
    THEN B%=0
920 B%=B%+1
    :GOTO 900
930 NEXT T%
    :NEXT S%
    :NEXT I%
940 ENDPROC
950 DEF PROCheader
960 IF N%=0
    THEN 1010
970 REPEAT
    :PROCline("* Press SPACE BAR
     *",30,3)
    :UNTIL GET =32
    :CLS
980 FOR I%=1TO 2
990 IF Nscore%(I%)>5 AND Owe%(I%)>0
    THEN Owe%(I%)=Owe%(I%)-5
    :Nscore%(I%)=Nscore%(I%)-5
1000 NEXT I%
1010 PROCcredit
1020 FOR I%=1TO 2
1030 IF I%=1
    THEN y%=22
    :yy%=12
    :
    ELSE y%=24
    :yy%=14
1040 IF Nscore%(I%)=0
    THEN Nscore%(I%)=5
    :Owe%(I%)=Owe%(I%)+5
    :PROCline("Bank lends",10,3)
    :PROCline("£5 to "+Name$(I%)
    ,yy%,3)
    :RESTORE 3170
    :PROCsound(6)
1050 IF Owe%(I%)>0
    THEN PROCprint("OWING TO BANK:"
    ,1,19,1)
    :PROCprint("______________",1
    ,20,1)
    :PROCprint(Name$(I%)+CHR$ 17+
    CHR$ 3+" £"+STR$ (Owe%(I%))
    ,1,y%,1)
1060 NEXT I%
1070 *FX15,1
1080 REPEAT
    :PROCline("* Press SPACE BAR
     *",30,3)
    :UNTIL GET =32
    :CLS
1090 PRINT TAB(17,6)AR$;TAB(17,15)AR$;
    TAB(17,25)AR$
1100 PROCline(Name$(1)+"'S HAND"
    ,2,3)
    :PROCline(Name$(2)+"'S HAND"
    ,11,3)
    :PROCline("BANK'S HAND",21,3)
1110 ENDPROC
1120 DEF PROCcredit
1130 PROCprint("CREDIT:",1,1,2)
    :PROCprint("______",1,2,2)
1140 PROCprint(Name$(1)+CHR$ 17+
    CHR$ 3+" £"+STR$ (Nscore%(1))
    ,1,4,2)
1150 PROCprint(Name$(2)+CHR$ 17+
    CHR$ 3+" £"+STR$ (Nscore%(2))
    ,1,6,2)
1160 ENDPROC
1170 DEF PROCstake
1180 FOR I%=1TO 2
1190 *FX15,1
1200 PROCline("Your stake,"+Name$(I%)+
```

→

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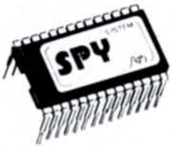

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Blackjack listing

From Page 103

```
     "?",30,2)
     :PRINT TAB(9,31)CHR$ 17+CHR$ 3+
     "£";
1210 Stake%(I%)=FNinput(2,"N")
1220 IF Stake%(I%)>Nscore%(I%)
     THEN PROCline("Too much-TRY AGAIN
     ",30,2)
     :PROCpause(250)
     :GOTO 1200
1230 PROCline("",30,0)
1240 IF I%=1
     THEN y%=6
     ELSE y%=15
1250 PROCprint(STR$ (Stake%(I%))
     ,0,y%,2)
1260 PROCpause(150)
1270 NEXT I%
1280 ENDPROC
1290 DEF PROCdeal
1300 VDU 5
1310 IF STflag%
     THEN STflag%=FALSE
     :P1%=3
     :A%(N%)=Bstore%
     :GOTO 1340
     ELSE N%=N%+1
1320 IF I%=1 OR I%=4
     THEN P1%=1
     :Y%=700
     :GOTO 1340
1330 IF I%=2 OR I%=5
     THEN P1%=2
     :Y%=400
     ELSE P1%=3
     :Y%=100
1340 PROCcard(X%,Y%)
1350 PROCval
1360 IF I%=3
     THEN X%=X%+200
1370 VDU 4
     :PROCpause(175)
1380 ENDPROC
1390 DEF PROCname
1400 FOR I%=1TO 2
1410 IF Ntotal%(I%)=21
     THEN PROCbj
     :GOTO 1670
1420 X%=328
1430 REPEAT
1440 X%=X%+200
1450 SOUND 1,-10,92+(I%*8),2
1460 PROCline("A CARD,"+Name$(I%)+
     "?",30,2)
1470 REPEAT
1480 G%=GET AND 223
1490 UNTIL G%=78 OR G%=89
1500 PROCline("",30,0)
1510 IF G%=78
     THEN 1640
1520 IF Stake%(I%)*2>Nscore%(I%)
      OR Buy%(I%)
     THEN 1620
1530 PROCpause(50)
1540 SOUND 1,-10,89+(I%*8),2
     :PROCline("DOUBLE YOUR STAKE?"
     ,30,2)
1550 REPEAT
1560 H%=GET AND 223
1570 UNTIL H%=78 OR H%=89
1580 PROCline("",30,0)
1590 IF H%=78
     THEN Buy%(I%)=TRUE
     :GOTO 1620
1600 IF I%=1
     THEN y%=6
     ELSE y%=15
1610 Stake%(I%)=Stake%(I%)+Stake%(I%)
     :PROCprint(STR$ (Stake%(I%))
     ,0,y%,2)
1620 PROCpause(100)
1630 PROCdeal
     :Ncards%(I%)=Ncards%(I%)+1
1640 UNTIL G%=78 OR Ncards%(I%)>2
      OR Ntotal%(I%)>20
1650 IF Ntotal%(I%)>21
     THEN PROCbust
1660 PROCline("",30,0)
1670 X%=160
1680 PROCpause(100)
1690 NEXT I%
1700 IF NBust%(1) AND NBust%(2)
     THEN NBflag%=TRUE
1710 ENDPROC
1720 DEF PROCbj
1730 PROCline("BLACKJACK-"+Name$(I%)+
     "!",30,2)
1740 PROCsound(1)
1750 Pflag%(I%)=TRUE
     :Ntotal%(I%)=22
1760 Nscore%(I%)=Nscore%(I%)+Stake%(I%
     )*2
1770 PROCpause(300)
1780 ENDPROC
1790 DEF PROCbust
1800 PROCline(Name$(I%)+"'S BUST"
     ,30,2)
1810 PROCsound(2)
1820 NBust%(I%)=TRUE
     :Ntotal%(I%)=0
1830 Nscore%(I%)=Nscore%(I%)-Stake%(I%)
1840 PROCpause(300)
1850 ENDPROC
1860 DEF PROCbank
1870 IF Pflag%(1)=FALSE AND Pflag%(2)=
     FALSE
     THEN 1910
1880 IF Pflag%(1) AND Pflag%(2)
     THEN Nbj%=TRUE
     :GOTO 1900
1890 IF (Pflag%(1) AND NBust%(2)=
     FALSE ) OR (Pflag%(2) AND NBust%(
     1)=FALSE )
     THEN 1910
     ELSE Nbj%=TRUE
1900 IF Btotal%<>10 AND Btotal%<>11
     THEN ENDPROC
1910 STflag%=TRUE
     :X%=328
     :Y%=100
1920 REPEAT
1930 PROCdeal
     :Bcards%=Bcards%+1
1940 IF Btotal%=21 AND Bcards%=1
     THEN BPflag%=TRUE
     :PROCsound(1)
     :PROCline("Bank gets BLACKJACK!"
     ,30,2)
     :PROCpause(250)
     :GOTO 1960
1950 IF Nbj%
     THEN Bcards%=4
1960 UNTIL Btotal%>16 OR Bcards%>3
1970 IF Btotal%>21
     THEN Btotal%=0
     :BBust%=-1
     :PROCsound(2)
     :PROCline("BANK'S BUST",30,2)
     :PROCpause(250)
1980 ENDPROC
1990 DEF PROCcheck
2000 FOR K%=1TO 2
2010 IF NBust%(K%)
     THEN 2090
2020 IF BBust%
     THEN Btotal%=0
     :GOTO 2060
2030 IF BPflag%
     THEN Btotal%=22
2040 IF Btotal%=Ntotal%(K%)
     THEN Me$="HOLD STAKE-"+Name$(K%)
     ELSE 2060
2050 IF Pflag%(K%) AND BPflag%
     THEN Nscore%(K%)=Nscore%(K%)-(2*S
     take%(K%))
     :GOTO 2090
     ELSE 2090
2060 IF Ntotal%(K%)>Btotal%
     THEN Me$=Name$(K%)+" WINS"
     ELSE GOTO 2080
2070 IF Pflag%(K%)
     THEN 2090
     ELSE Nscore%(K%)=Nscore%(K%)+Stak
     e%(K%)
     :GOTO 2090
```

→

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Blackjack listing

From Page 105

```
2080 Nscore%(K%)=Nscore%(K%)-Stake%(K%)
2090 NEXT K%
2100 ENDPROC
2110 DEF PROCwin
2120 IF NBust%(1) OR NBust%(2)
     THEN 2180
2130 IF BBust%
     THEN 2190
2140 IF Me$="BANK WINS" AND Ntotal%(1)
     =Btotal%
     THEN Me$="HOLD STAKE-"+Name$(1)
     :GOTO 2210
2150 IF Ntotal%(2)=Btotal% AND Ntotal%
     (1)>Btotal%
     THEN Me$=Name$(1)+" WINS"
     :GOTO 2210
2160 IF Btotal%<>Ntotal%(1) OR Btotal%
     <>Ntotal%(2)
     THEN 2180
2170 IF BPflag% AND (Pflag%(1)=
     FALSE OR Pflag%(2)=FALSE )
     THEN 2200
     ELSE Me$="BOTH HOLD STAKE"
     :GOTO 2210
2180 IF Btotal%>Ntotal%(1) AND Btotal%
     >Ntotal%(2)
     THEN Me$="BANK WINS"
     :GOTO 2200
2190 IF Ntotal%(1)>Btotal% AND Ntotal%
     (2)>Btotal%
     THEN Me$="YOU BOTH WIN"
     :PROCsound(3)
     :GOTO 2210
2200 IF Me$="BANK WINS"
     THEN PROCsound(4)
2210 PROCline(Me$,30,2)
     :PROCpause(400)
2220 ENDPROC
2230 DEF PROCline(Line$,Y%.c%)
2240 PRINT TAB(0,Y%)SPC (33);
2250 Tab%=(20-LEN (Line$))/2
2260 PRINT TAB(Tab%.Y%)CHR$ 17+
     CHR$ c%+Line$;
2270 ENDPROC
2280 DEF PROCpause(D%)
2290 R%=INKEY (D%)
2300 ENDPROC
2310 DEF PROCcard(X%.Y%)
2320 IF I%=6
     THEN GCOL 185,1
     ELSE GCOL 0.1
2330 MOVE X%.Y%
2340 MOVE X%+160,Y%
2350 PLOT 85,X%,Y%+200
2360 PLOT 85,X%+160.Y%+200
2370 GCOL 0,0
2380 ENDPROC
2390 DEF PROCval
2400 IF I%=6
     THEN Bstore%=A%(N%)
     :ENDPROC
2410 GCOL 0,3
2420 X$=""
     :P$=""
2430 IF A%(N%)=1
     THEN X$="A"
     :GOTO 2490
2440 IF A%(N%)=10
     THEN MOVE X%+24,Y%+112
     :PRINT "10"
     :GOTO 2500
2450 IF A%(N%)=11
     THEN A%(N%)=10
     :X$="J"
     :MOVE X%+56.Y%+104
     :PRINT X$
     :GOTO 2500
2460 IF A%(N%)=12
     THEN X$="Q"
     :P$=Q$
     :A%(N%)=10
     :GOTO 2490
2470 IF A%(N%)=13
     THEN X$="K"
     :P$=K$
     :A%(N%)=10
     :GOTO 2490
2480 X$=STR$ (A%(N%))
2490 MOVE X%+8,Y%+180
     :PRINT X$
     :MOVE X%+104,Y%+40
     :PRINT X$
     :IF X$="A"
     THEN MOVE X%+56,Y%+112
     :PRINT ST$(ST%(N%))
     :GOTO 2520
2500 MOVE X%+86,Y%+180
     :PRINT ;ST$(ST%(N%))
     :MOVE X%+8,Y%+40
     :PRINT ;ST$(ST%(N%))
     :IF X$="J"
     THEN MOVE X%+56.Y%+136
     :PRINT CHR$ 244
2510 IF P$=Q$ OR P$=K$
     THEN MOVE X%+24,Y%+128
     :PRINT P$
2520 VDU 4
2530 IF P1%=3
     THEN PROCBtotal
     ELSE PROCNtotal
2540 ENDPROC
2550 DEF PROCsound(S%)
2560 ON S% GOTO 2570 ,2580 ,2590
     ,2600 ,2610 ,2690
2570 SOUND 1,1,70,10
     :ENDPROC
2580 SOUND 1,2,101,10
     :SOUND 1,2,81,10
     :ENDPROC
2590 SOUND 1,3,73.10
     :SOUND 2,3,101,10
     :ENDPROC
2600 SOUND 1,2,77,5
     :SOUND 1,2,89,5
     :SOUND 1,2,101,5
     :ENDPROC
2610 FOR T%=1TO 14
2620 IF T%=5
     THEN A%=0
     ELSE A%=-12
2630 IF T%<6
     THEN B%=-12
     ELSE B%=0
2640 READ P%.D%
2650 SOUND 1.A%,P%.D%
2660 SOUND 2.A%-B%,P%-48.D%
2670 SOUND 3.A%-B%,P%+48.D%
2680 NEXT T%
     :ENDPROC
2690 FOR T%=1TO 22
2700 IF T%=7
     THEN A%=0
     ELSE A%=-12
2710 READ P%.D%
2720 SOUND 1.A%,P%.D%
2730 NEXT T%
     :ENDPROC
2740 DEF PROCNtotal
2750 IF A%(N%)>1
     THEN 2770
2760 IF Ntotal%(P1%)<11
     THEN A%(N%)=11
     :NAflag%(P1%)=TRUE
2770 Ntotal%(P1%)=Ntotal%(P1%)+A%(N%)
2780 IF NAflag%(P1%) AND Ntotal%(P1%)>
     21
     THEN Ntotal%(P1%)=Ntotal%(P1%)-10
     :NAflag%(P1%)=FALSE
2790 IF P1%=1
     THEN y%=6
     ELSE y%=15
2800 PROCprint(STR$ (Ntotal%(P1%))
     .18.y%.3)
2810 ENDPROC
2820 DEF PROCBtotal
2830 IF A%(N%)>1
     THEN 2850
2840 IF Btotal%<11
     THEN A%(N%)=11
     :BAflag%=TRUE
2850 Btotal%-Btotal%+A%(N%)
2860 IF BAflag% AND Btotal%>21
     THEN Btotal%=Btotal%-10
     :BAflag%=FALSE
2870 PROCprint(STR$ (Btotal%),18
     ,25,3)
```

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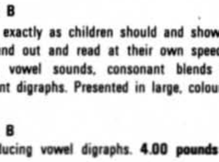

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TMU11

Blackjack listing

This listing is included in this month's cassette tape offer. See order form on Page 101.

```
2880 ENDPROC
2890 DEF FNinput(Len,Type$)
2900 LOCAL CH$,CHcode,L%,Input$
2910 L%=0
     :Input$=""
2920 SOUND 1,-10,93+(I%*8),2
2930 CHcode=GET
2940 IF CHcode>96 AND CHcode<123

     THEN CHcode=CHcode-32
2950 IF CHcode=13 AND L%=0
     THEN 2920
2960 IF CHcode=13
     THEN 3060
2970 IF CHcode=127 AND L%=0
     THEN 2920
2980 IF CHcode=127
     THEN L%=L%-1
     :Input$=LEFT$(Input$,L%)
     :GOTO 3050
2990 IF Type$="N"
     THEN 3010
3000 IF CHcode<65 OR CHcode>90
     THEN 2920
     ELSE 3030
3010 IF CHcode<48 OR CHcode>57
     THEN 2920
3020 IF CHcode=48 AND L%=0
     THEN 2920
3030 IF L%=Len
     THEN 2920
3040 L%=L%+1
     :Input$=Input$+CHR$ (CHcode)
3050 PRINT CHR$ (CHcode);
     :GOTO 2930
3060 IF Type$="N"
     THEN =VAL (Input$)
     ELSE =Input$
3070 DEF PROCprint(T$,x%,y%,c%)
3080 PRINT TAB(x%,y%)CHR$ 17+CHR$ c%+T
     $+CHR$ 17+CHR$ 3;
3090 ENDPROC
3100 DEF PROCclear
3110 X%=128
   - :Bcards%=0
     :BBust%=FALSE
     :Btotal%=0
     :STflag%=FALSE
     :BAflag%=FALSE
     :BPflag%=FALSE
     :NBflag%=FALSE
     :Nbj%=FALSE
     :Me$=""
3120 FOR I%=1TO 2
3130 Ncards%(I%)=0
     :Ntotal%(I%)=0
     :NAflag%(I%)=FALSE
     :NBust%(I%)=FALSE
     :Pflag%(I%)=FALSE
     :Buy%(I%)=FALSE
3140 NEXT I%
3150 ENDPROC
3160 DATA 97,8,101,4,105,8,109,24
     ,0,8,109,4,117,8,125,4,129,8
     ,137,4,129,8,97,4,117,8,109
     ,20
3170 DATA 129,4,121,4,129,4,121,4
     ,117,8,101,8,0,8,117,4,121,4
     ,129,4,121,4,129,4,121,4,117
     ,4,121,4,129,4,137,4,141,4,137
     ,4,145,4,137,4,129,16
```

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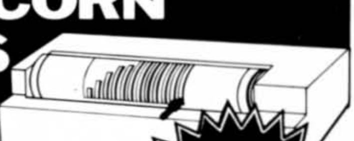

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Goblins listing

From Page 53

```
  10 MODE7
  20 VDU23,0,8202;0;0;0;
  30 PROCdefine
  40 PROCintro
  50 REPEAT
  60 MODE2:VDU23,0,8202;0;0;0;
  70 PROCscreen:VDU5
  80 REPEAT
  90 PROCpixie
 100 PROCgoblin
 110 PROCscore
 120 UNTIL kill=-1 OR home=-1 OR bn%<
1
 130 MODE7:VDU23,0,8202;0;0;0;
 140 IF kill=-1 SOUND&13,3,250,30
 150 IF kill=-1 OR bn%<1 men=men-1:A%
=1216:B%=156:kill=0:A$="Y"
 160 IF men=0 PROCanother
 170 IF home=-1 PROChome:A$="Y"
 180 UNTIL INSTR("N",A$)<>0
 190 REM reset
 200 END
 210 REM-------------------------
 220 DEF PROCpixie
 230 TIME=0:moved=0:drop=0
 240 REPEAT:*FX15,1
 250 A$=INKEY$(10)
 260 IF A$="L"AND L%>0 PROCshiftbush:
FOR T=0TO1000:NEXTT
 270 IF A$=" "AND drop=0ANDbomb>0 dro
p=-1:bomb=bomb-1
 280 IF A$="," PROCmanleft:moved=-1:h
%=3
 290 IF A$="." PROCmanright:moved=-1:
h%=1
 300 IF A$="A" PROCmanup:moved=-1:h%=
2
 310 IF A$="Z" PROCmandown:moved=-1:h
%=4
 320 IF TIME>50 ch%=ch%+sheet:TIME=0
 330 UNTIL ch%>4*sheet OR moved=-1
 340 IF moved=-1 SOUND1,-7,70,2:SOUND
2,-7,120,2:SOUND1,-5,80,5:SOUND2,-5,60
,3
 350 IF A%=0 ANDB%>980 home=-1
 360 ENDPROC
 370 REM-------------------------
 380 DEF PROCmanleft
 390 PROCclear(A%,B%)
 400 IFdrop=-1 VDU18,0,8,8,236
 410 IF POINT(A%-64,B%)=0 A%=A%-64
 420 MOVEA%,B%:VDU18,0,5,231,8,18,0,7
,225,18,0,3,8,228
 430 ENDPROC
 440 REM-------------------------
 450 DEF PROCmanright
 460 PROCclear(A%,B%)
 470 IFdrop=-1 VDU18,0,8,8,236
 480 IF POINT(A%+64,B%)=0 A%=A%+64
 490 MOVEA%,B%:VDU18,0,5,231,8,18,0,7
,225,18,0,3,8,229
 500 ENDPROC
 510 REM-------------------------
 520 DEF PROCmanup
 530 PROCclear(A%,B%)
 540 IFdrop=-1 VDU18,0,8,8,236
 550 IF POINT(A%,B%+32)=0 B%=B%+32
 560 MOVEA%,B%:VDU18,0,5,231,8,18,0,7
,225,18,0,3,8,230
 570 ENDPROC
 580 REM-------------------------
 590 DEF PROCmandown
 600 PROCclear(A%,B%)
 610 IFdrop=-1 VDU18,0,8,8,236
 620 IF POINT(A%,B%-32)=0 B%=B%-32
 630 MOVEA%,B%:VDU18,0,5,231,8,18,0,7
,225,18,0,3,8,226
 640 ENDPROC
 650 REM-------------------------
 660 DEF PROCgoblin
 670 FOR R%=0TO sheet
 680 X%=64*(x%?R%):Y%=32*(y%?R%)-4
 690 IF x%?R%=255 PROCdelay:GOTO880
 700 IF x%?R%>250 PROCflash:GOTO880
 710 MOVEX%,Y%:VDU18,0,0,255
 720 V%=X%-A%:W%=Y%-B%:moved=0
 730 IF V%=0 AND W%>0 PROCgoblind:GOT
O850
 740 IF V%=0 AND W%<0 PROCgoblinu:GOT
O850
 750 IF W%=0 AND V%>0 PROCgoblinl:GOT
O850
 760 IF W%=0 AND V%<0 PROCgoblinr:GOT
O850
 770 IF W%>=V% AND V%>0 PROCgoblind:P
ROCgoblinl:GOTO850
 780 IF W%<V% AND W%>0 PROCgoblinl:PR
OCgoblind:GOTO850
 790 IF V%+W%>=0 ANDW%<0 PROCgoblinl:
PROCgoblinu:GOTO850
 800 IF V%+W%<0 ANDV%>0 PROCgoblinu:P
ROCgoblinl:GOTO850
 810 IF W%<=V% AND V%<0 PROCgoblinu:P
ROCgoblinr:GOTO850
 820 IF W%>V% AND W%<0 PROCgoblinr:PR
OCgoblinu:GOTO850
 830 IF V%+W%<=0 ANDW%>0 PROCgoblinr:
PROCgoblind:GOTO850
 840 IF V%+W%>0 ANDV%<0 PROCgoblind:P
ROCgoblinr:GOTO850
 850 IF x%?R%>250 GOTO890
 860 MOVEX%,Y%:VDU18,0,12,255,8,18,0,
4,224,8,18,0,7,225,18,0,0,8,230,18,0,1
,8,227
 870 IF X%=A% AND Y%=B% kill=-1
 880 x%?R%=X%/64:y%?R%=(Y%+4)/32
 890 NEXTR%
 900 ENDPROC
 910 REM-------------------------
 920 DEF PROCgoblinu
 930 IF moved=-1 ENDPROC
 940 IF POINT(X%,Y%+32)=0 Y%=Y%+32:mo
ved=-1:ENDPROC
 950 IF POINT(X%,Y%+32)=8 Y%=Y%+32:PR
OCexplode:moved=-1
 960 ENDPROC
 970 REM-------------------------
 980 DEF PROCgoblind
 990 IF moved=-1 ENDPROC
1000 IF POINT(X%,Y%-32)=0 Y%=Y%-32:mo
ved=-1:ENDPROC
1010 IF POINT(X%,Y%-32)=8 Y%=Y%-32:PR
OCexplode:moved=-1
1020 ENDPROC
1030 REM-------------------------
1040 DEF PROCgoblinl
1050 IF moved=-1 ENDPROC
1060 IF POINT(X%-64,Y%)=0 X%=X%-64:mo
ved=-1:ENDPROC
1070 IF POINT(X%-64,Y%)=8 X%=X%-64:PR
OCexplode:moved=-1
1080 ENDPROC
1090 REM-------------------------
1100 DEF PROCgoblinr
1110 IF moved=-1 ENDPROC
1120 IF POINT(X%+64,Y%)=0 X%=X%+64:mo
ved=-1:ENDPROC
1130 IF POINT(X%+64,Y%)=8 X%=X%+64:PR
OCexplode:moved=-1
1140 ENDPROC
1150 REM-------------------------
1160 DEF PROCclear(p,q)
1170 MOVEp,q:VDU18,0,0,255
1180 ENDPROC
1190 REM-------------------------
1200 DEF PROCdefine
1210 DIM x% 20,y% 20
1220 men=3:sheet=1:sc%=0:bn%=100:L%=5
:bomb=0:ch%=0
1230 kill=0:home=0:A%=1216:B%=156:HI%
=0
1240 VDU23,224,0,62,73,93,54,34,20,54
1250 VDU23,225,0,0,54,34,0,0,0,0
1260 VDU23,226,0,0,0,34,0,0,0,0:REMdo
wn
1270 VDU23,227,0,0,0,0,28,0,0,0
1280 VDU23,228,0,0,36,0,0,0,0,0:REMri
ght
```

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From Page 111

```
 1290 VDU23,229,0,0,18,0,0,0,0,0:REMle
ft
 1300 VDU23,230,0,0,20,0,0,0,0,0:REMup
 1310 VDU23,231,34,62,73,95,127,93,20,
54
 1320 VDU23,232,28,88,120,60,116,171,2
54,151
 1330 VDU23,233,92,122,180,119,250,173
,126,56
 1340 VDU23,234,0,24,60,126,126,126,12
6,126
 1350 VDU23,235,126,126,126,126,126,12
6,126,126
 1360 VDU23,236,129,0,24,60,60,24,0,12
9
 1370 VDU23,255,255,255,255,255,255,25
5,255,255
 1380 ENVELOPE1,4,1,20,0,55,6,50,1,6,0
,-3,50,120
 1390 ENVELOPE2,2,.5,22,127,40,10,120,
2,1,0,-2,100,126
 1400 ENVELOPE3,2,-3.5,-2,-0.5,40,30,1
00,2,1,0,-2,100,126
 1410 ENVELOPE4,2,100,50,-4,40,30,100,
4,-4,0,-2,126,50
 1420 DATA80,9,12,2
 1430 ENDPROC
 1440 REM-------------------------
 1450 DEF PROCscreen
 1460 VDU19,14,0,0,0,0,0:VDU18,0,1,17,
2,17,142:VDU19,12,0,0,0,0,0
 1470 MOVE0,0:MOVE0,124:PLOT85,1280,0:
PLOT85,1280,124
 1480 FORX%=0TO19:FORY%=0TO26 STEP2
 1490 IF RND(50)>40 VDU31,X%,Y%,232,8,
10,233
 1500 NEXTY%,X%
 1510 VDU5,18,0,14:PROChomes
 1520 FORN%=0TO19:x%?N%=&FF:NEXTN%
 1530 FORN%=0TO 19
 1540 REPEAT
 1550 X%=RND(20)*64-64:Y%=(RND(28)+4)*
32
 1560 UNTILPOINT(X%+32,Y%-20)=0
 1570 moved=0
 1580 PROCgoblinu:x%?N%=X%/64:y%?N%=Y%
/32
 1590 NEXTN%
 1600 VDU18,0,0:PROChomes
 1610 VDU4,31,0,29,17,7,17,129:PRINT;"
Men      Score"
 1620 VDU4,31,0,30:PRINT;"Sheet    Bonu
s"
 1630 VDU4,31,0,28,17,7,17,129:PRINT;"
Leaf     Coins"
 1640 bomb=1+bomb:bn%=sheet*100
 1650 ENDPROC
 1660 REM-------------------------
 1670 DEF PROChomes
 1680 MOVE0,1024:MOVE190,1024:PLOT85,0
,896:PLOT85,190,896
 1690 MOVE1024,256:MOVE1280,256:PLOT85
,1024,128:PLOT85,1280,128
 1700 MOVE0,1020:VDU18,0,3,234,8,10,23
5:MOVEA%,B%:VDU18,0,5,231,8,18,0,7,225
,18,0,3,8,229
 1710ENDPROC
 1720 REM-------------------------
 1730 DEF PROCscore
 1740 bn%=bn%-ch%:ch%=0
 1750 VDU4,31,14,28,17,6,17,129:PRINT;
bomb:VDU31,6,28:PRINT;L%
 1760 VDU31,6,29:PRINT;men:VDU31,14,29
:PRINT;sc%
 1770 VDU4,31,6,30:PRINT;sheet:VDU4,31
,14,30:PRINT;bn%;"  ":VDU5
 1780 ENDPROC
 1790 REM-------------------------
 1800DEF PROCanother
 1810 IF sc%>HI% HI%=sc%
 1820 PRINTTAB(9,1);CHR$130;CHR$141;"G
AME OVER";TAB(9,2);CHR$130;CHR$141;"GA
ME OVER"
 1830 PRINTTAB(7,6);CHR$131;"You reach
ed sheet ";sheet
 1840 PRINTTAB(7,8);CHR$131;"You score
d ";sc%
 1850 PRINTTAB(7,10);CHR$131;"HIGH SCO
RE ";HI%
 1860 PRINTTAB(0,13);CHR$130;"Press Y
to have another go or N to stop"
 1870 men=3:bonus=100:sheet=1:kill=0:s
c%=0
 1880 bn%=100:L%=5:bomb=0
 1890 REPEAT:A$=GET$:UNTILA$="Y" OR A$
="N"
 1900 ENDPROC
 1910 REM-------------------------
 1920 DEF PROChome
 1930 home=0:sc%=sc%+bn%:bn%=100*sheet
:ch%=0:A%=1216:B%=156
 1940 sheet=sheet+1
 1950 SOUND1,1,50,50
 1960 ENDPROC
 1970 REM-------------------------
 1980 DEF PROCintro
 1990 *FX9,3
 2000 *FX10,3
 2010 FOR S%=0TO11:CLS
 2020 PRINTTAB(S%+3,S%);CHR$141;CHR$(1
29+(S%MOD3));"OB";TAB(18,S%);CHR$(129+
(S%+2)MOD3);"L";TAB(31-S%,S%);CHR$(129
+(S%+1)MOD3);"IN"
 2030 PRINTTAB(S%+2,11);CHR$141;CHR$13
1;"G";TAB(35-S%,11);"S";TAB(S%+2,12);C
HR$141;CHR$131;"G";TAB(35-S%,12);"S"
 2040 PRINTTAB(S%+4,22-S%);CHR$141;"
";TAB(19,22-S%);" ";TAB(32-S%,22-S%);"
  "

 2050 PRINTTAB(S%+3,23-S%);CHR$141;CHR
$130;"OB";TAB(18,23-S%);CHR$131;"L";TA
B(31-S%,23-S%);CHR$134;"IN"
 2060 FOR WT=0TO100:NEXT WT
 2070 NEXT S%:CLS:PRINTTAB(14,11);CHR$
141;CHR$133;CHR$136;"GOBLINS";TAB(14,1
2);CHR$141;CHR$133;CHR$136;"GOBLINS"
 2080 SOUND1,-14,34,10:SOUND1,-14,81,1
0
 2090 SOUND1,-14,60,5:SOUND1,-14,75,5
 2100 SOUND1,-14,90,10:SOUND1,-14,105,
10
 2110 SOUND1,-14,90,10:SOUND1,-14,85,5
 2120 SOUND1,-14,70,5:SOUND1,-14,100,2
0
 2130    FORWT=0TO5000:NEXTWT
 2140 CLS
 2150 *FX9,25
 2160 *FX10,25
 2170 PRINTTAB(11,1);CHR$141;CHR$130;"
GOBLINS":PRINTTAB(11,2);CHR$141;CHR$13
0;"GOBLINS"
 2180 PRINTTAB(10,3);CHR$131;"========
==="
 2190 PRINTTAB(1,5);CHR$134;"Kaplan th
e happy pixie has lost his"TAB(0,6);CH
R$134;"way home. You have to guide him
 through"
 2200 PRINTTAB(0,7);CHR$134;"the mirky
 wood to his cave. ";TAB(1,8);CHR$134;
"The woodland folk are terrorised by"
 2210 PRINTTAB(0,9);CHR$134;"goblins a
nd these must be avoided.";TAB(0,10);C
HR$134;"Rest too long and they will tr
ace the"
 2220 PRINTTAB(0,11);CHR$134;"scent.";
TAB(0,12);CHR$134;" To combat these, K
aplan has been"
 2230 PRINTTAB(0,13);CHR$134;"given fi
ve magic coins which if";TAB(0,14);CHR
$134;"dropped, will kill the next gobl
in to"
 2240 PRINTTAB(0,15);CHR$134;"go over
it. But be warned. It is strong";TAB(0
```

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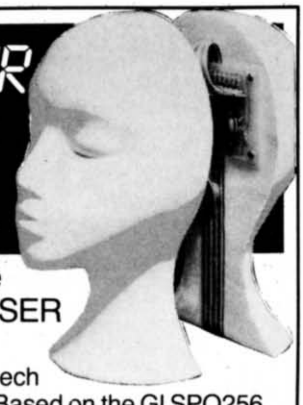

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Goblins listing

From Page 113

```
,16);CHR$134;"magic and can kill Kapla
n if he is"
 2250 PRINTTAB(0,17);CHR$134;"too clos
e to the goblin.";TAB(1,18);CHR$134;"A
lso, in his wisdom, the wizard gave"
 2260 PRINTTAB(0,19);CHR$134;"five lea
ves which, when dropped will";TAB(0,20
);CHR$134;"remove the bush in front of
 Kaplan."
 2270 PRINTTAB(9,23);CHR$130;"Press an
y key."
 2280 *FX15,1
 2290 G=GET:CLS
 2300 PRINTTAB(7,2);CHR$131;"PIXIE CON
TROLS";TAB(7,3);CHR$130;"=============
="
 2310 PRINTTAB(10,5);"LEFT    <"
 2320 PRINTTAB(10,7);"RIGHT   >"
 2330 PRINTTAB(10,9);"UP      A"
 2340 PRINTTAB(10,11);"DOWN    Z"
 2350 PRINTTAB(10,13);"LEAVES  L"
 2360 PRINTTAB(10,15);"COIN    SPACE"
 2370 PRINTTAB(4,22);CHR$130;"Press SP
ACE BAR to play."
 2380 *FX15,1
 2390 REPEAT:G=GET:UNTILG=32
 2400 ENDPROC
 2410 REM-------------------------
 2420 DEF PROCexplode
 2430 SOUND&12,2,15,45
 2440 MOVEX%,Y%:VDU18,0,0,255,8,18,0,1
1,224,8,18,0,7,225,18,0,0,8,230,18,0,1
,8,227
 2450 FORWT=0TO3000:NEXTWT:MOVEX%,Y%:V
DU18,0,0,255
 2460 IF (A%-X%)^2+((Y%-B%)*2)^2<9000
kill=-1
 2470 x%?R%=251
 2480 sc%=sc%+100
 2490 ENDPROC
 2500 REM-------------------------
 2510 DEF PROCshiftbush
 2520 SOUND&11,4,250,8
 2530 IFh%=1ANDPOINT(A%+64,B%)<>12 MOV
EA%+64,B%:VDU18,0,0,255
 2540 IFh%=2ANDPOINT(A%,B%+32)<>12 MOV
EA%,B%+32:VDU18,0,0,255
 2550 IFh%=3ANDPOINT(A%-64,B%)<>12 MOV
EA%-64,B%:VDU18,0,0,255
 2560 IFh%=4ANDPOINT(A%,B%-32)<>12 MOV
EA%,B%-32:VDU18,0,0,255
 2570 L%=L%-1
 2580 ENDPROC
 2590 REM-------------------------
 2600 DEF PROCflash
 2610 x%?R%=x%?R%+1
 2620 T%=(255-x%?R%)*4
 2630 REM:*FX9,T%
 2640 REM:*FX10,T%
 2650 IFx%?R%=&FF MOVEX%,Y%:VDU18,0,0,
255
 2660 ENDPROC
```

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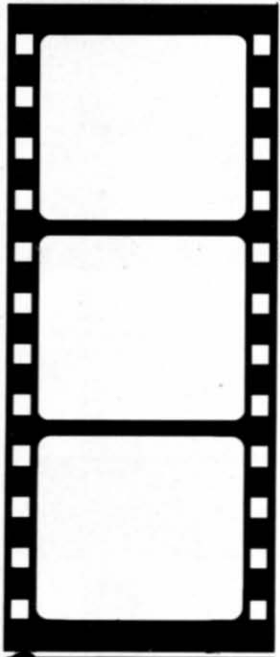

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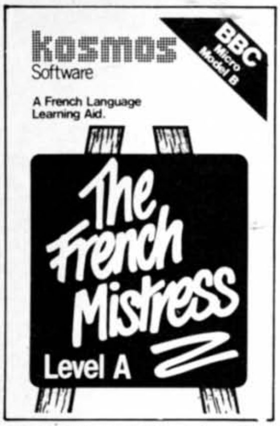
From Page 58

```
    :REM SET ROM TEXT
450 REM
460 REM
470 ?P%=&82
    :P%=P%+1
    :REM SET ROM TYPE (SERVICE)
480 ?P%=(9+TL%)
    :P%=P%+1
    :REM SET POINTER TO (C)
490 ?P%=&00
    :P%=P%+1
    :REM SET VERSION NUMBER
500 $P%=T$
    :P%=P%+TL%
    :REM SET ROM NAME
510 ?P%=&00
    :P%=P%+1
    :REM MARK END OF ROM NAME
520 ?P%=&28
    :P%=P%+1
    :REM (
530 ?P%=&43
    :P%=P%+1
    :REM C
540 ?P%=&29
    :P%=P%+1
    :REM )
550 $P%=C$
    :P%=P%+CL%
    :REM SET COPYRIGHT (AUTHOR'S
     NAME)
560 REM
570 REM
580 REM
    :REM ASSEMBLE BASIC PROGRAM
     DOWNLOADER
590 REM
    :REM AND COMMAND DETECTION ROUTINE
600 REM
610 REM
620 P%=&3030
630 [OPTX%
640 CMP #&04 \CHECK FOR UNKNOWN
     "*"CALL
650 BEQ ASEPT \BRANCH TO CHECK CALL
660 RTS \RETURN -CALL NOT SERVICED
670 .FINISH
680 PLA
685 TAX
690 PLA
695 TAY
700 PLA
710 RTS \RETURN -CALL NOT SERVICED
720 \
730 \
740 \
750 \
760 \ ROUTINE TO CHECK FOR CORRECT
     STAR CALL
770 .ASEPT \CHECK CALL
780 PHA
785 TYA
790 PHA
795 TXA
800 PHA
810 ]
820 R%=P%+3
    :REM SET MARKER
830 FOR H%=1 TO COM%
    :REM SET UP REQUIRED NUMBER
     OF COMPARISONS
840 [OPT X%
850 LDA(&F2),Y \GET CHARACTER
    OFF ERED BY OS
860 CMP #&00 \COMPARE WITH REQUIRED
     COMMAND
870 BNE FINISH \RTS IF NOT EQUAL
880 INY
890 ]
900 NEXT H%
910 [OPT X%
920 LDA(&F2),Y \GET CHARACTER
    OFF ERED BY OS
930 CMP #&0D \CHECK FOR END OF COMMAND
940 BNE FINISH \RTS IF NOT EQUAL
950 \
960 \
970 \ CORRECT STAR CALL -PREPARE
     TO DOWNLOAD
980 \
990 \
1000 LDA &18 \GET PAGE HI BYTE FROM
      ZERO PAGE
1010 STA &71 \STORE AS DESTINATION
      START ADDRESS (IN ZERO PAGE )
1020 LDA #&82 \LOAD SOURCE START
      ADDRESS
1030 STA &73 \STORE AS SOURCE START
      ADDRESS (IN ZERO PAGE )
1040 LDA #&00 \SET SOURCE AND DESTINAT
     ION LO BYTES
1050 STA &70
1060 STA &72
1070 LDY #&FF \PRESET Y REGISTER
1080 \
1090 \
1100 .MAINLOOP \MAIN TRANSFER LOOP
1110 \
1120 \
1130 ]
1140 S%=P%
     :REM SET MARKER
1150 [OPT X%
1160 LDA &73 \LOAD SOURCE ADDRESS
      HI BYTE
1170 CMP #&00 \CHECK FOR LAST PAGE
1180 BEQ LASTLOOP \BRANCH TO LASTLOOP
      ON LAST PAGE
1190 INY
1200 LDA (&72),Y \LOAD CHARACTER
      FROM EPROM
1210 STA (&70),Y \SAVE CHARACTER
      IN RAM
1220 CPY #&FF \CHECK FOR NEW PAGE
1230 BNE MAINLOOP
1240 INC &71 \INCREMENT DESTINATION
1250 INC &73 \INCREMENT SOURCE
1260 CLC \JUMP TO START OF MAINLOOP
1270 BCC MAINLOOP
1280 \
1290 \
1300 .LASTLOOP \TRANSFER LOOP
     FOR LAST FRACTION OF CODE
1310 \
1320 \
1330 INY
1340 CPY #&00 \CHECK FOR END OF BASIC
      PROGRAM
1350 BEQ DONE
1360 LDA (&72),Y \LOAD CHARACTER
      FROM EPROM
1370 STA (&70),Y \SAVE CHARACTER
      IN RAM
1380 CLC
1390 BCC LASTLOOP
1400 \
1410 .DONE
1420 LDX #&00 \"OLD" AND "RUN"
     TO KEYBOARD BUFFER
1430 LDA #&8A
1440 \
1450 \
1460 LDY #&4F \"O"
1470 JSR &FFF4
1480 LDY #&4C \"L"
1490 JSR &FFF4
1500 LDY #&44 \"D"
1510 JSR &FFF4
1520 LDY #&0D \CARRIAGE RETURN
1530 JSR &FFF4
1540 LDY #&52 \"R"
1550 JSR &FFF4
1560 LDY #&55 \"U"
1570 JSR &FFF4
1580 LDY #&4E \"N"
1590 JSR &FFF4
1600 LDY #&0D \CARRIAGE RETURN
```

→

Learning a Language?



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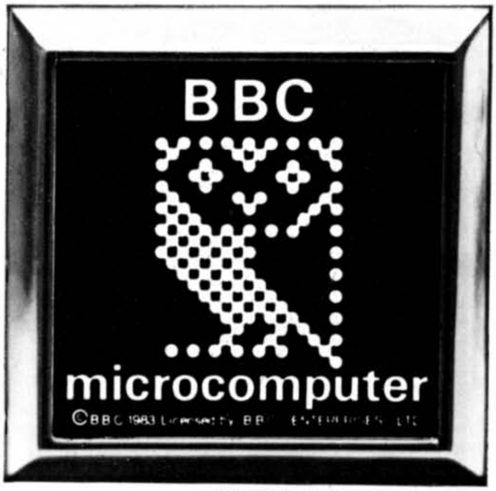
GU14 0BP.

Sideways ROM listing

From Page 117

```
1610 JSR &FFF4
1620 \
1630 \
1640 PLA
1645 TAX
1650 PLA
1655 TAY
1660 PLA
1665 LDA #&00
1670 RTS
1680 ]
1690 NEXT X%
1700 REM
     :REM END OF TWO PASS ASSEMBLER
      LOOP
1710 :
1720 :
1730 REM
     :REM REPLACE DUMMY VALUES WITH
      REAL ONES
1740 :
1750 :
1760 FOR X%=1 TO COM%
     :REM PLACE CORRECT CHARACTERS
      AFTER CMP'S
1770 ?R%=ASC (MID$(COM$,X%,1))
1780 R%=R%+7
1790 NEXT X%
1800 PLH%=(L%DIV 256)+&82
     :REM CALCULATE PROGRAM LENGTH
      HI BYTE
1810 PLL%=L%MOD 256
     :REM CALCULATE PROGRAM LENGTH
      LO BYTE
1820 S%?3=PLH%
     :REM SET PROGRAM LENGTH HI BYTE
      INTO CODE
1830 S%?24=PLL%
     :REM SET PROGRAM LENGTH LO BYTE
      INTO CODE
1840 CLS
1850 REM
1860 REM
1870 PRINT "BASIC PROGRAM AND PROGRAM
      LOADER NOW    LOCATED IN BUFFER:
      -"
1880 PRINT
1890 PRINT "                         START
      ADDRESS &3000"
1900 PRINT "
      END ADDRESS &";~((&3200+L%)-1)
1910 PRINT "
             LENGTH &";~(L%+&200)
1920 VDU 26,31,0,12
1930 PRINT "CLEANING REMAINDER OF
      BUFFER"
1940 FOR X%=(&3200+L%) TO &6FFF
1950 ?X%=&FF
1960 NEXT X%
1970 PRINT "COMPLETED-NOW LOAD EPROM
      BLOWER"
1980 PRINT "PAGE=&";~PAGE
1990 END
```

This listing is included in this month's cassette tape offer. See order form on Page 101.



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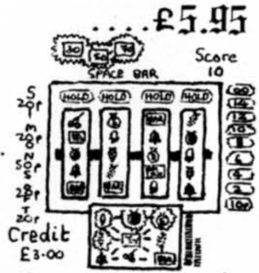

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MICROMAIL

Micronet loses its spartan image

I STARTED writing my own programs shortly after reading the first edition of The Micro User. They were all full of the frowned upon GOTO, but they worked and gave me a great deal of satisfaction.

Your September issue hit on a few subjects which are relevant to me. I have just upgraded to discs and the benefits in speed, plus the ability to modify programs with the minimum of fuss are worth the large outlay in cash, at least to me anyway.

I bought the Amcom DFS one week before I saw the article but couldn't try it until after it, when my disc drive arrived.

They both took about a week to arrive, Acorn please note.

*If your reviewer types * HELP DFS he will find it works OK. I have Wordwise fitted and it doesn't prevent access.*

I'm afraid I won't be using your test time programs as it won't make any difference to me. The benefits over the cassette are enormous, so seconds on most things are no problem.

I have been a member of Micronet since February, when it was a little bit spartan to say the least. Since then it has gone from strength to strength.

Like you they have a large letters page (I feel that puts you way ahead of anyone else) which is good even if they do make fun of some of the writers (mutual at times).

I think the Mailbox facility is excellent and I have made a few contacts already.

How is it I haven't come across your Mailbox number yet? There is even a off line Mailbox program which can be uploaded to the Enterprise computer from disc (a bit pointless on cassette for short messages) to save time and money. – **Tom Wilkins, Gateshead.**

● You can contact us through Micronet. The number for *The Micro User* is 614568383.

Smiling through

CONGRATULATIONS on the magazine. Speaking as a computing ignoramus, I find it a bit like "Smiley's People" – I've no idea what the hell's going on, but I'm totally riveted!

A suggestion. There must be hundreds of BBC adventurers like myself up and down the country who are trapped in pits or stuck on pinnacles, and are searching high and low for answers.

Other across-the-board magazines have an adventure page to cater for our needs, but there's nothing worse than spending out one's hard-earned loot to find that this month, the column is all about Scott Adams, or Zork, or some other game unavailable for the Beeb.

It's frustrating, and I'm beginning to feel the urge to go out and tap my head lightly against large metal things.

So how about a BBC adventure page? You can do it, and idiots such as myself would gladly contribute. – **James Bibby (absolutely no relation), Birkenhead.**

● In those halcyon days before we became computer journalists we used to play adventure games – the old fashioned sort with no electronics but lots more arguments.

So your idea is appealing, particularly as it provides us with an excuse to play some games again.

If there's enough demand from other readers we might just indulge. Let's hear your views.

Locked up software

PLEASE could you explain the meaning of the error message "Locked" (ERR=213). My machine has Basic I, OS 1.2, but no disc interface.

This error occurred when I typed CH."" Return, allowed the cassette recorder to play over a section of an old unreadable program which the computer did not try to load, switched to fast forward, then pressed play.

The computer then switched off the cassette motor and printed "Locked". – **Simon M. Price, Horncastle, Lincs.**

● To prevent copying, a lot of commercial software is loaded in several parts. Unless you follow the correct order, things start to go wrong.

Acornsoft, and perhaps other software houses, put something in the tape header of certain of these parts to prevent them being loaded by normal means (CHAIN, LOAD, *LOAD, etc.).

Any attempt at normal loading results in the message "Locked". Such sections can only be loaded by the previous part of the program.

Pacing the DFSs

I AM writing in response to Jim Notman's review of the Acorn, Pace and Watford DFSs.

Having just changed from an Acorn system to the Pace one I felt the review was unfair towards the Pace system.

Firstly, the benchmarks published bear no resemblance to the tests I performed – I include a table of my results.

As you can see, the Acorn values are almost identical, so differing disc drives can be eliminated (mine is also Cumana).

Whereas Jim Notman's results indicate that the Pace system is the slowest of the three, my results show equivalence in five tests, an improvement in eight tests and an increase in only four tests.

Admittedly Program I still takes an agonisingly long time and Program VIII would only run if the bytes were input as a number, not a string.

The Pace system also

→

Basic scrolling

WHILE reading your excellent publication I noticed a letter from a reader from my home town asking about scrolling in Basic.

So until your article on the 6845 comes out may I offer this short procedure to give you downward scrolling:

```
1000 DEFPROC SCROLL(S,L)
1010 LOCAL X,Y:VDU30
1020 FOR X = 1 TO L
1030 FOR Y = 1 TO S:NEXT Y
1040 VDU11 : NEXT X
1050 ENDPROC
```

'S' gives the scroll rate (try 150) and 'L' gives the number of lines to scroll from the top, such as 32 or 25 for a full page.

So now I await your article on the 6845, which should prove most interesting – **N.D. Blount, Wolverhampton.**

● The procedure basically uses the VDU 11 command to move the cursor up the screen. When it reaches the top the contents scroll down.

It all goes to show how versatile is the BBC Micro. There are usually many ways to solve the same problem.

MICROMAIL

From Page 121

supplies an 8 way DIL switch for the links at the bottom right of the keyboard, and setting two of these links (384) as recommended in the Pace manual for Teac half height drives reduces the access time and hence the benchmarks considerably.

*In addition, I presume my version is a later edition than the one tested as it now has the *ACCESS command in both Acorn and Extended modes.*

This is not intended as a criticism of your magazine, which I enjoy, merely an informed reader adding his findings and correcting an unfair impression of a product – **I. Cummings, West Wickham, Kent.**

Test	Acorn	Pace (normal)	Pace (access time reduced key links 384)
Save 16k	4.58	4.7	4.5
Load 16k	4.30	4.0	3.8
Prog 1	3.7	13 for 10	7 for 10
Prog 2a	17.1	7.4	6.2
Prog 2b	61	70	36
Prog 3a	13.4	7.2	5.8
Prog 3b	56.5	24.8	23.7
Prog 4	9.7	5.3	4.3
Prog 5	6.5	4.6	3.3
Prog 6	2.5	4	3.0
Prog 7a	63.6	101	40.8
Prog 7b	58.7	26.6	24.5
Prog 8a	239	217	69.6
Prog 8b	98.4	22*	20*

* *If A$ is changed to A.*

Screen previews

THANK you for an excellent magazine, which contains first rate programs and some priceless information about using the BBC computer.

I am writing to you with a small request/suggestion. Would it be possible in the future to publish some photographs of actual screen displays of the programs that you publish as listings?

I feel this would be far more interesting and informative than the type of "coloured sketch" that you precede the listings with at the moment.

It would also give us some idea of what to expect after spending a week typing the program into the machine.

Keep up the good work. – **F. Court, Coventry.**

Cassette tip

HAVING read one of your "cassette problems" articles I have a tip to add.

Many of the smaller cassette recorders have a button marked Monitor, or something similar, which selects whether what you are recording is played through the speaker or not.

When the recorder is connected to the computer you will not hear anything if you use this button, but you may find that if you have recording problems then switching this button to "off" will help.

If the switch is part of the tone control system then you will have to switch the monitor off for saving and to the most reliable tone setting for loading.

If the switch is separate you should be able to leave it switched to "off" for both loading and saving. – **Michael Beaton, Shaftesbury, Dorset.**

No great saving

WITH reference to the article by Peter Walker in the August edition of The Micro User on transferring programs from tape to disc, I point out the last paragraph: "If you can buy programs on disc do so . . . as you also get all the space left on that disc for your own use".

I tried this. I saved a very small program on the disc called "S" to see if it would work satisfactory. It did. There it was on the disc "S".

I then deleted program S. All OK, but when I tried to autoboot the Monster Game (Acornsoft) the disc drive made very unusual noises and the program didn't load or run.

I would like to point out to readers of your excellent magazine that it may be a good idea to leave their bought program disc alone and so not run the danger of losing the programs on it. – **S. Haylett, Grimsby.**

Plea for printerless

I MUST commend your team on producing a splendid publication having a mass of technical content, extremely good and varied articles and thoroughness of translation to the user of some of the many facilities of the BBC machine.

However, I am rather disappointed in the entry criteria for your competitions – namely, cassette and printout.

I can understand why you require to be able to ponder over a listing, but this most probably excludes a large number of users/readers (myself included) from entry and consequently a possible means of acquiring some very useful additional equipment.

July's issue came and suddenly a glimmer of hope for a printer. However after painstaking attempts my crossword still has three or four blank answers for clues.

August issue has arrived and reverted to cassette plus listing.

Please, let's have more non-listing competitions for us printer-less mortals!

I find rather amazing the current craze within the computer industry as a whole to treat the dreaded GOTO as taboo and label it as an almost do not use instruction.

In practice I have found that if one programs in a logical "top-down" structure, then unnecessary GOTOs are, in general, averted but often remain a necessary tool to allow continuance through the program's logic paths.

The current impressions given are that GOTOs should in fact never be used – they are in most languages out of necessity and will almost certainly have to be used from time to time.

I feel that the current attack on this short and often powerful command has probably arisen due to some very bad and illogical programming techniques.

These often occur when major modifications to a program or routine are required which have to be sometimes crudely inserted into existing code by a programmer not familiar with the techniques or fully understanding them – quite often a complete rewrite would perhaps have been the best solution, if feasible! – **Brian J. Coles, Surbiton, Surrey.**

● Sorry about our requirements for cassette and listings but we have to be very thorough in judging our competitions. Sometimes we need both to be efficient and totally fair.

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MICROMAIL

From Page 122

We do try to vary our competitions however, to give as many people as possible a chance to enter.

The GOTO question seems to arouse as much controversy as bloodsports, cricket and Barry Manilow combined!

We think that the majority of people agree that GOTO is a bad thing. As with so many bad things, most of us do it!

Rocket for Robin

I FOUND Robin and Marian in the September issue of The Micro User very good and being a "pedestrian user" altered line 940 as suggested in the text.

Then I thought that it would be nice to have a choice of speeds and alter the speed as I improved. I added the following lines to the program in order to do this . . .

```
 165 PROCchoice
 940 IF BY%<-RND(500)-C%
      A%=0
     :B%=0
2570 DEF PROCchoice
2580 PROCheader
2590 PRINT TAB(6,10)"CHOOSE
      LEVEL OF DIFFICULTY.";
     TAB(6,12)"1.(easy)-6.(h
     ard)";INPUT F%
2600 IF F%<1 OR F%>6
     PROCchoice
2610 C%=900-(F%*100)
2620 ENDPROC
```

I hope that this may be of interest to other readers of your excellent magazine. – **K.C. Bell, Ashton-in-Makerfield, Lancs.**

Sideways scrolling

I REFER to the interesting article in the September 1983 Micro User, Inside The Electron, which mentioned the BBC computer's ability to scroll sideways easily.

I would be very grateful if you could explain how this side scrolling is achieved, as I have been unable to find reference to it in the User Guide and in the "deep digging" section of Micromail the sideways scrolling suggested only works in Mode 7.

Also, I have recently acquired a light pen and I am able to produce coloured pictures on the screen which I would like to save on tape (as done on the Spectrum).

But I'm not sure how to do this. Please could you inform me if it can be done. – **P. Dodridge, Plymouth.**

● Sideways scrolling isn't particularly difficult, but is best done from machine code. Alan Plume intends to cover this in a future article.

Also, we published Anthony Robinson's screen save in Micro User, July, 1983. To use this effectively, you'll probably want to call it via the interrupt routine, and alter OSFILE.

It's not too difficult, and we're writing a workshop article about it.

However, if you can't wait, all the details you need are in the excellent Advanced User Guide, which is advertised on Page 76.

Wordwise break bug

HAVING read with interest Chris Martin's review of Wordwise in the July edition of Micro User, I was most surprised to find that he had omitted to introduce readers to the infamous Wordwise BREAK BUG.

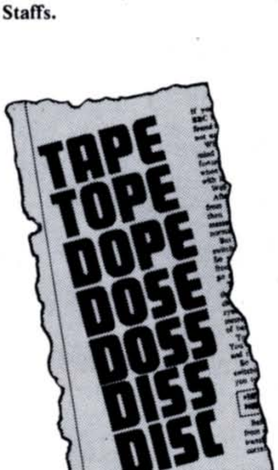
Although to be fair, Computer Concepts don't mention it either.

So for all those readers who are still unacquainted with the little beast, may I explain.

First of all, spend about an hour or so typing and editing a very important document, then before saving and printing, preview the text in 80 column mode (option 7).

When the prompt "Press any key" appears, press Break – it does say any key. Now answer 'Y' to the "Old text" prompt and you are back to the menu.

Pressing Escape to get into edit mode will now reveal that all your precious text has been corrupted and any attempt to retrieve it will only crash the computer. In some cases a complete switch off is necessary. – **M.H. Cantrill, Burton-on-Trent, Staffs.**



TAPE
TOPE
DOPE
DOSE
DOSS
DISS
DISC

IN the August 1983 edition of The Micro User Peter Walker gives helpful advice on conversion from tape to disc with the headline above.

Now according to Collins' English Dictionary, "diss" is non-existent, "doss", slang and "tope" boozing (17th century French), a variety of shark or another name for a stupa!

May I suggest my own sequence: TAPE CAPE CASE CASH DASH DISH DISC?

Or are the words I mentioned highly technical jargon I've never heard of?

Seriously, thank you for a good and informative read! – **Christopher H. Kimberley, Pershore, Worcs.**

● The function of headlines is to get people to read the associated article. And this ours obviously did! Incidentally, Diss is a town in Norfolk.

Keeping her happy

HOW can I keep up my wife's interest without Mike Bibby's tutorial article?

What happened to part 7 promised in the August issue?

Am I still in the running for the prize in the July competition? I cannot find any reference to a winner. – **D.G. Coleman, Ilford.**

● Sorry about the missing tutorial article. My wife is following it as well, so I won't be able to get away with it in future.

As for the competition, the result is on page 67 and I'm afraid you didn't win.

Bug in the guide

YOUR correspondent John Tissandier (Micromail, September) was having trouble turning off the flashing cursor using the way suggested on page 77 of the User Guide.

There is a misprint in the guide at this point and I suspect this is the cause of the problem. The command to turn off the cursor in OS 0.10 should be

```
VDU 23;8202;0;0;0;
```

In the guide the final semicolon is omitted. Mr Tissandier solved the problem by adding an extra ;0. He does not actually need the 0 (it won't, in fact, make any difference), but he certainly needs the extra semicolon.

Any VDU statement simply sends a string of bytes to a certain machine code routine in the MOS.

However putting a semicolon after a number causes it to be sent as two bytes – the first will be the number MOD 256 and the second the number DIV 256. Thus:

```
VDU 23;8202;0;0;0;
```

is exactly the same as

```
VDU 23,0,10,32,0,0,0,0,0,0
```

*(because 8202 = 10 + 32*256). [See page 385 of the User Guide for further explanation of*

→

MICROMAIL

From Page 125

this form of the VDU 23 command.]

It is important that a VDU 23 command is followed by nine further bytes sent to the MOS routine. If less than nine bytes are sent (and there will be only eight if the last semicolon is left out), then the next chunk of data output, whether to tape, screen, printer or whatever, will be more or less corrupted and this could well lead to the problems Mr Tissandier has encountered.

Some of your readers with OS 0.1 might like to know how the cursor can be turned on again. The User Guide gives a neat way of doing this for later MOS versions, but not for issue 0.1 (except by changing mode).

The command you need is slightly different when in Mode 7 from when in other modes. In Mode 7 use:

```
VDU 23,0,10,114,0,0,0,0,0,0
```

or, if you prefer:

```
VDU 23;29194;0;0;0;
```

and in Modes 0-6 use:

```
VDU 23,0,10,103,0,0,0,0,0,0
```

or:

```
VDU 23;26378;0;0;0;
```

If you have a program which runs in all modes then you can find out which mode you are in by looking at memory location &367. So you can turn the cursor on with:

```
IF ?&367=7 THEN VDU
23;29194;0;0;0;
ELSE VDU 23;26378;0;0;0;
```

– D.L. Harper, Mansfield.

GOSUB and consent

ONCE I had a difficult bit of bricklaying to do on the gable end of a garage. It was difficult for me, a beginner in bricklaying, so I bunged in a piece of wood and plenty of mortar. It seemed to solve the problem.

Later I had a similar problem but I persevered and bricked it up properly. Not only had I done a good job – I had also learned something. When the bit of wood in the gable end went rotten I did the job properly, as I should have done in the first place.

Your faint-hearted micro user (Micromail, August) should take the same view. GOTO and GOSUB remain in new Basics for various reasons including compatibility and a kind of historical/marketing trap.

A good book, or articles in this journal, about structured programming are an incomparably better guide to programming than any Basic manual, though you need one of these for reference.

While I disagree with, and publicly deplore, the use of GOTO and GOSUB, I would defend with my last breath the right of consenting adults to use them in private, provided they do not show their work to beginners, particularly not to children.– **Roy Atherton, Reading.**

Summation errors

HERE is a listing of a program running on the BBC B, with OS 1.00, and DFS 0.90.

It illustrates a possible cause of much frustration in tracing errors in a summation based on the string slicing MID$(C$,start,1) if start is allowed to become zero, either on purpose or by accident.

Note that MID$(C$,0,1) is treated as MID$(C$,1,1) without any indication of DIMENSION or ELEMENT error in trying to start at the 0th character in C$!

I trust this will alert others to this unhelpful behaviour. – **P. Dobson, Long Acre, London.**

```
10 PRINT "TRY 54321 AS
INPUT"
20 INPUT "ENTER NUMBERS
ONLY"C$
30 H=0
40 FOR Z=0 TO LEN C$
50 H=H+VAL(MID$(C$,Z,1))
60 NEXT
70 FOR I=0 TO LEN C$
80 PRINT "MID$(C$,";I;",1))=
";MID$(C$,I,1))
90NEXT
100 PRINT "TOTAL (H) = ";H
110 PRINT "TOTAL SUPPOSED TO
BE= ";H-VAL(MID$(C$,0,1))
120 PRINT '"NOTE THAT
MID$(C$,0,1), IS TREATED AS
"
130 PRINT "MID$(C$,1,1), SO
WATCH OUT"
140 PRINT "FOR THIS MISTAKE
IN A FOR/NEXT LOOP."
150 STOP
160 END
```

And finally, with tongue firmly in cheek . . .

Hell hath no fury like Andrea . . .

Dear Trev,

Sorry I haven't written for so long, but I've been having a few problems.

Andrea has been getting stroppy about the amount of time I spend "playing" with my Beeb. Everytime I come downstairs she screams: "It's that strange man from the spare bedroom!"

It's getting me down. If I make a move to go upstairs she glares at me. She doesn't say anything, just glares. Last night I was sitting in the armchair for an hour before I had the nerve to go up to the toilet. She can be quite formidable, Andrea.

What's annoying is she won't come out with it direct. If I bring the subject up all she says is "It's good that you have a little hobby", and "I'm sure it's all very nice, dear", in her Margaret Thatcher voice.

The other evening she was on the phone to her mother (The Dragon Lady of Wilmslow) and I distinctly heard the words "unnatural" and "obsession".

I tried to listen in on the extension but I think they realised because all I heard was "at least it's not schoolgirls" and then the line went dead.

All this war-of-nerves stuff is bad, but what's worse is that she's discovered my Achilles heel (no, it's not a new game). Every evening this week I've come home to find her sitting in front of the TV with the electric fire on, using the sewing machine.

Nothing wrong in that you might think, but she's got the three-way adaptor and she knows I can't afford another until she gives me my pocket money at the end of the month.

She says: "I won't be long dear, just another dozen costumes for the local rep", and I'm left Beebless for the evening.

Not only that, but my Welcome cassette now has Barry Manilow on it and I know she detests him almost as much as I do. It's getting ridiculous.

I looked for my Beeb User for two hours last night before giving in and asking her where it was. "Oh, the Bumper Fun Book for Boys – it's in the cat litter tray – you didn't want it, did you?"

If only I could be sure of a jury with at least one micro enthusiast . . .

Cheers, if that's the right word, ***Bob***

PS It's Andrea's birthday soon. I'm going to give her a programmable calculator.

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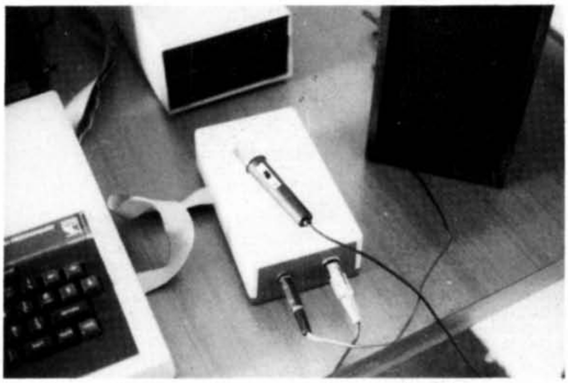

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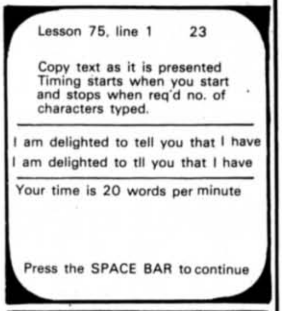


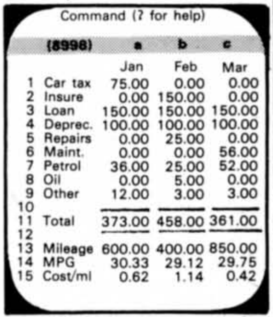
```
Lesson 75, line 1        23

Copy text as it is presented
Timing starts when you start
and stops when req'd no. of
characters typed.

I am delighted to tell you that I have
I am delighted to tll you that I have

Your time is 20 words per minute


Press the SPACE BAR to continue
```



```
        Command (? for help)

   (8998)       a       b       c
               Jan     Feb     Mar
 1 Car tax   75.00    0.00    0.00
 2 Insure     0.00  150.00    0.00
 3 Loan     150.00  150.00  150.00
 4 Deprec.  100.00  100.00  100.00
 5 Repairs    0.00   25.00    0.00
 6 Maint.     0.00    0.00   56.00
 7 Petrol    36.00   25.00   52.00
 8 Oil        0.00    5.00    0.00
 9 Other     12.00    3.00    3.00
10          ______  ______  ______
11 Total    373.00  458.00  361.00
12          ______  ______  ______
13 Mileage  600.00  400.00  850.00
14 MPG       30.33   29.12   29.75
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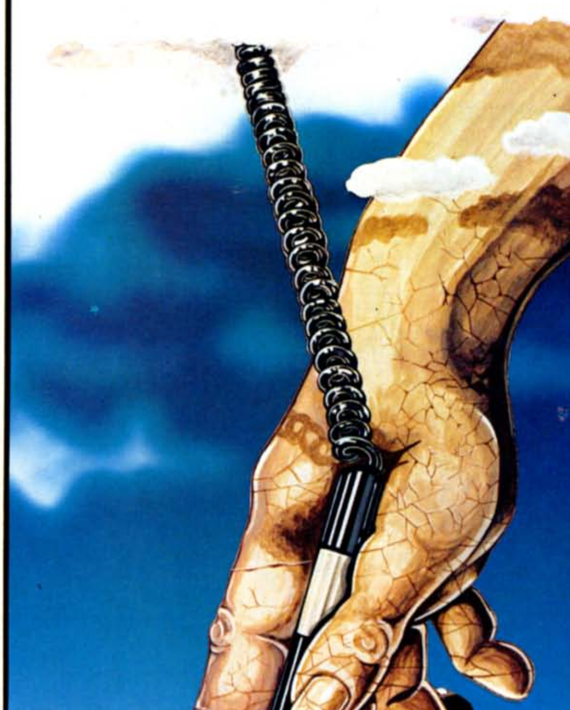
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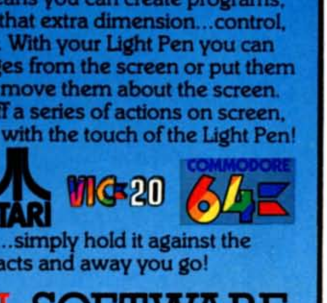
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Dexterity and fast responses are at a premium in this second arcade-type game in the Felix series.

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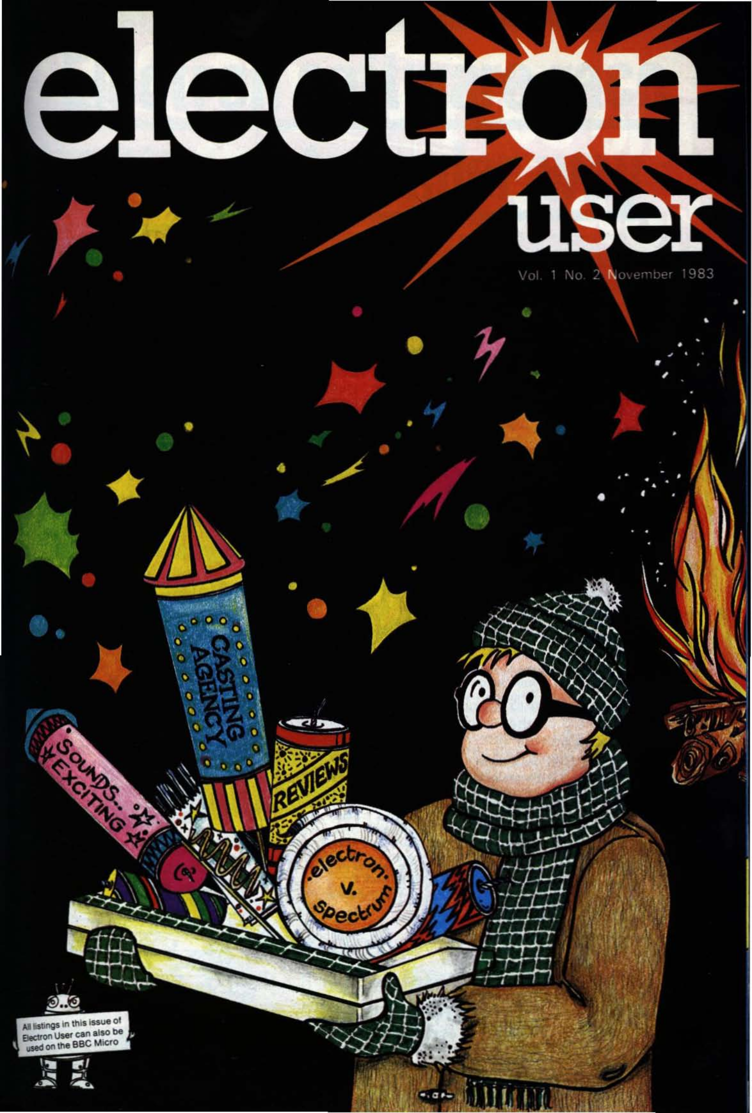
electron user

Vol. 1 No. 2 November 1983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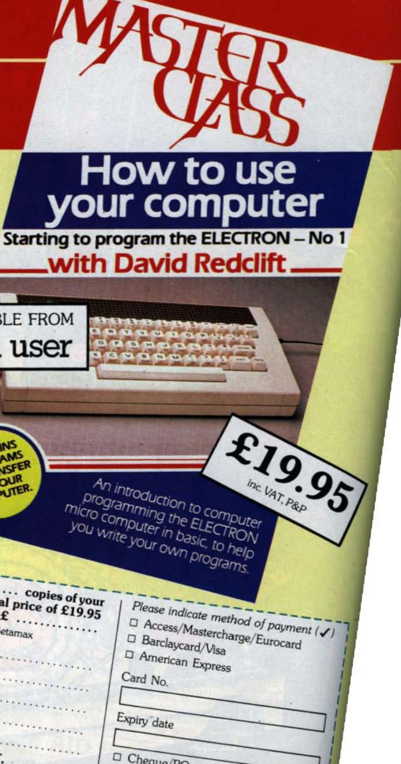
All listings in this issue of Electron User can also be used on the BBC Micro

The easy way to learn how to program your Electron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Electron software race gets under way

THE arrival of the Acorn Electron has created a stir among many firms that supply the microcomputer industry.

It's predicted phenomenal success means a rich new market for software producers and its expansion possibilities are already tempting hardware designers.

The lead in the race to produce software for the Electron seems to be shared between three firms.

As might be expected, Acornsoft was the first to launch a series of packages designed for the Electron, ranging from old favourites like arcade games and educational programs to utility packages and alternative computer languages such as Forth and Lisp.

Big names like A & F Computing and Micro Power have been racing to convert the best of their BBC Micro games to work on the Electron. The main difficulty they have encountered is that the Electron, though sharing the same Basic as the BBC Micro, is slower – although a fast micro in its own right.

The software has to be adjusted to compensate for the reduced speed and some other, minor, hardware differences between the two machines. But both companies say they will have a comprehensive range of Electron software in the very near future.

In fact so great is the expected demand for the Electron that W.H. Smith had ordered 12,500 cassettes from Micro Power before a single Electron had been sold.

All over the country other software houses are tooling up to meet the challenge provided by the micro that may be the best selling in history.

And it's not just the software houses who are bracing themselves for the Electron boom. The companies who produce hardware add-ons are aware of its expansion possibilities and are developing products with that in mind.

The race to be first to produce hardware add-ons seems to have been won by Sir Computers, of Cardiff. Already it has a combined A to D (joystick) and Centronics printer interface which will cost about £40.

Plans for the near future include a ROM board to enable eventual expansion and an adapter that will give the Electron Mode 7 – the teletext mode.

Over in Cambridge, Acorn is certainly working on hardware to use the expansion port, though there are no firm details as yet.

So even before the Electron has been sold in any substantial numbers the microcomputer industry is rushing to support it.

W.H. Smith has started selling it in their shops – the first time the firm has ever marketed an "unproven" micro.

With practical support like this, coupled with the tremendous amount of interest and activity in everything to do with the Electron, Acorn's new baby has been launched with more prospects for its ultimate success than any other micro has ever enjoyed in the past.

Production rate is doubled

THE demand for the Electron is so intense that the production line in Malaysia, where they are working overtime to meet Acorn's order for 100,000 machines, cannot cope.

An urgent SOS last month to the Welsh factory that makes the BBC Micro has resulted in agreement to speed up the creation of a second Electron production line in Gwent.

The firm has agreed to produce an additional 100,000 Electrons.

To do so it is taking on another 100 workers, and has promised Acorn they will be able to turn out 4,000 machines a week, starting in January.

The factory is being extended to accommodate the extra plant, and a rush order has gone out for newly-developed automatic insertion and test equipment.

The head of the firm, Henry Kroch, said: "We have been making the BBC Micro for more than a year. So far our production has increased tenfold".

First production models of the Electron were airlifted from Singapore to Britain in September and were immediately snapped up by dealers and software developers.

As demand from potential Electron users escalated, the Malaysian manufacturers promised that supplies would be shipped out weekly. Even so it is unlikely sufficient machines will be available to meet all pre-Christmas orders.

electron user

Electron User welcomes program listings and articles for publication. Listings should be accompanied by cassette tape or disc.

Send to:
Electron User, Europa House,
68 Chester Road, Hazel
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Electron User is an independent publication. Acorn Computers Ltd are not responsible for any of the articles in this issue, or for any of the opinions expressed.

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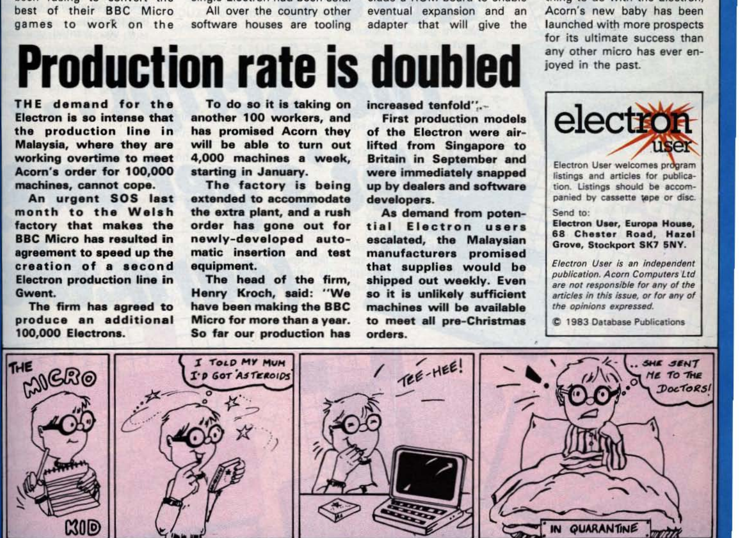

THE MICRO KID
I TOLD MY MUM I'D GOT 'ASTEROIDS'
TEE-HEE!
... SHE SENT ME TO THE DOCTORS!
IN QUARANTINE

Casting Agency

EVERY month in Casting Agency we'll be giving you a selection of user-defined characters.

In a later issue we'll show you how to make your own. But, for the time being, let's just concentrate on how to use the ones we've got.

It's quite straightforward, you'll be glad to hear.

Let's take the mouse. You'll see that the letters and numbers that define it are:

```
VDU23,224,99,99,28,28,72,92,
92 ,124
```

The VDU23 part tells the Electron that what comes next will define a particular shape.

The next figure tells the micro the code number that will be used to refer to the shape. In this case the mouse will be known by the number 224.

However the micro won't know what you're doing until you actually type in VDU23, the reference number, the following figures and commas, and then press the Return key.

That is, before you can use the user-defined character you actually have to enter, or define, it.

You can, if you want, define it during a program by a line such as:

```
10 VDU23,224,99,99,28,28,72,
92,92 ,124
```

Once you've defined the character you can then tell the micro to display it by referring to its code number. In this case it is 224.

You use the PRINT and CHR$ keywords to instruct the micro to do this.

So to see the mouse you enter:

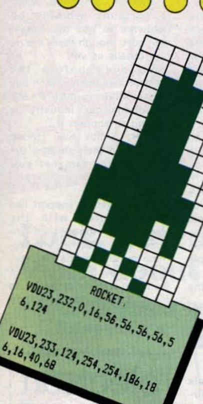
```
PRINT CHR$(224)
```

and press the Return key.

Hey presto! A mouse appears. If it doesn't, check that you've entered the definition properly.

If you wanted you could

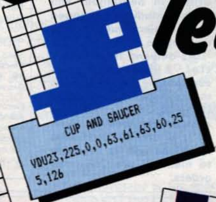
Here's the script... let's get busy learn the



ROCKET

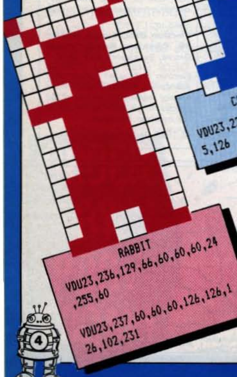
```
VDU23,232,0,16,56,56,56,56,5
6,124

VDU23,233,124,254,254,186,18
6,16,40,68
```



CUP AND SAUCER

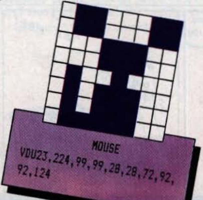
```
VDU23,225,0,0,63,61,63,60,25
5,126
```



RABBIT

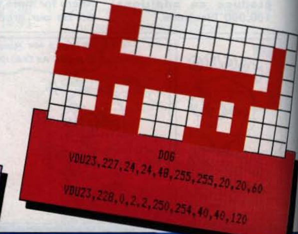
```
VDU23,236,129,66,60,60,60,24
,255,60

VDU23,237,60,60,60,126,126,1
26,102,231
```



MOUSE

```
VDU23,224,99,99,28,28,72,92,
92,124
```



DOG

```
VDU23,227.24,24,48,255,255,20,20,60

VDU23,228.0,2.2,250,254,40,40,120
```

call up the mouse in a program line such as:

```
20 PRINT CHR$(224)
```

But remember the character must have been previously defined or the Electron will be confused!

Incidentally you might find that mode 1 or mode 2 will display the little chap rather better than the mode 6 which you're in when you switch the Electron on.

Just type in MODE 1 or MODE 2 and press Return to get the mode you want.

So, to recap, you must define the character by entering the appropriate VDU23 statement. Then you can display it on the screen using its code number, PRINT and CHR$.

It's really quite simple to use.

The trouble is that all these code numbers are fairly similar and can easily be confused.

Also they don't mean very much. Is 238 a dragon or a spoon? Or is it anything at all?

One way to make things clearer – after you've defined the characters – is to label them in a meaningful way.

We know that CHR$(224) contains the mouse, because we can PRINT it onto the screen.

and lines

So let's label CHR$(224).

We do this by thinking up a name (in this case "mouse").

Then we put a $ sign on the end to show that it's a label. This makes it equal to CHR$(244).

It's easier to do than to read about. All you do is enter:

```
mouse$=CHR$(224)
```

and press the RETURN key. Then if you want a mouse you can just use:

```
PRINT mouse$
```

instead of:

```
PRINT CHR$(224)
```

It makes things a lot easier.

"Ah", but you might ask, "What about the dog? That's got two VDU23 s to define it. What do we do with two of them?"

Again, it's quite simple. If you look at the picture you'll see that the dog is made up of two characters put together to form a larger one.

All you do is to type in both VDU23 statements, in this case:

```
VDU23,227,24,24,48,255,255,
20, 20,60
```

and

```
VDU23,228,0,2,2,250,254,40,
40, 120
```

and don't forget to press Return after each one.

To get your dog on screen just use:

```
PRINT CHR$(227) CHR$(228)
```

and it will appear.

Make sure that you get them in the right order or you'll get the back before the front.

To make it easier to use, let's label it again. In the case of two VDU23 statements we just add the two CHR$ together.

Let's use the label "dog$" – you mustn't forget the $ on the end.

Enter:

```
dog$=CHR$(227)+CHR$(228)
```

and now you can get your dog by:

```
PRINT dog$
```

So if you have two VDU23 statements that define bits of a larger character you just print them one after the other or add them together in a label.

This isn't just limited to two parts of a figure. You can have three or more pieces fitted together to form a larger character.

Just remember to keep them in order or you'll get some funny looking characters on the screen!

Finally you'll notice that some of the Casting Agency characters consist of two or more parts but they're not in a straight line like the dog.

They're one on top of the other. The rocket is a case in point.

It's not difficult to produce the rocket. Just define the parts as before by typing in the two VDU23 statements.

You'll then have the two bits of the rocket as CHR$(232) and CHR$(233).

The problem is to put the bits on the screen one on top of the other so that they join to form a rocket.

It's easily solved. Just make a label again and add the bits as before, only with a little bit of "magic" to produce the desired result.

In this case let's use the label "rocket$". All that's needed is to enter:

```
rocket$=CHR$(232) + CHR$(8)
+ CHR$(10) + CHR$(233)
```

Now, to produce your rocket just enter:

```
PRINT rocket$
```

and it will appear on the screen.

The "magic" is to include CHR$(8) and CHR$(10) in between the two bits of the defined character.

CHR$(8) moves the print cursor back one position and CHR$(10) moves it down one position.

Using one after the other moves the cursor directly below the last thing printed.

In this case the bottom part of the rocket appears directly below the top half as desired.

Don't worry too much if you don't understand the print cursor part.

All you have to know is that to print one part of a defined character directly on top of the other you just add them together in a label with CHR$(8) + CHR$(10) between them.

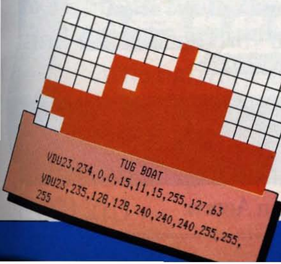
For example, to produce the rabbit we just enter the VDU23 statements. Then we make the label up as follows:

```
rabbit$ = CHR$(236) + CHR$
(8) + CHR$(10) + CHR$(237)
```

Now you can produce your rabbit by:

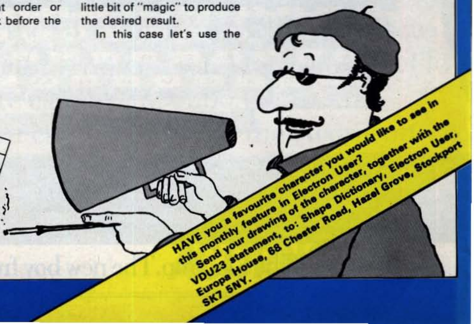
```
PRINT rabbit$
```

And that's all there is to it. Have fun with the characters from the Casting Agency!



TUG BOAT

```
VDU23,234,0,0,15,11,15,255,127,63
VDU23,235,128,128,240,240,240,255,255,
255
```



HAVE you a favourite character you would like to see in this monthly feature in Electron User? Send your drawing of the character, together with the VDU23 statement, to: Shape Dictionary, Electron User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

The new boy from Acorn already has a gang of playmates.

The Acorn Electron, Britain's most exciting new home micro, already has a range of software programs specially designed for it by Acornsoft, makers of software for the BBC Micro.

There are six mind-boggling games, two programming languages, two exciting graphics cassettes, a home educational program and a personal money management program.

All of which will soon help familiarize you with the Electron and show you how to get the maximum enjoyment out of it straight from the word go.

Of course, we'll be constantly designing new software to help you fully realise the Electron's limitless potential.

You'll find all the programs featured here, plus the full

acorn electron

The Electron. The new boy from Acorn.

acorn electron
Snapper
acorn electron
Meteors
acorn electron
Starship Command
acorn electron
Monsters
acorn electron
Chess
acorn electron
Draughts & Reversi
acorn electron
Creative Graphics
acorn electron
Graphs and Charts
acorn electron
Personal Money Management
acorn electron
Tree of Knowledge
acorn electron
LISP
acorn electron
FORTH

range of programs for the BBC Micro, available at selected W.H. Smith branches and at your local Acorn stockist. (To find out where they are call 01-200 0200.)

Alternatively, you can send off for the Acornsoft Electron or BBC Micro catalogue, by writing to:

Acornsoft, c/o Vector Marketing, Denington Estate,
Wellingborough, Northants
NN8 2RL.

ACORNSOFT

```
10 REM Roman Candle
20 MODE 2
30 PROCinit
40 REPEAT
50 VDU 19,15,1;0;
60 SOUND &10,-15,7,45
   :SOUND &11,1,RND(255)
   ,45
   :TIME =0
   :REPEAT UNTIL TIME >10
70 VDU 19,15,0;0;
80 C%=RND(6)
   :X%=576
   :D%=(RND(3)-2)*16
   :Y%=192
   :E%=120
90 REPEAT
100 Y%=Y%+E%
   :E%=E%-10
110 GCOL 3,C%
   :VDU 19,C%,RND(6);0;
120 MOVE X%,Y%
   :VDU 226
   :MOVE A%,B%
   :VDU 226
130 A%=X%
   :B%=Y%
   :X%=X%+D%
140 UNTIL Y%<-32
150 UNTIL 0
160 DEF PROCinit
170 A%=0
   :B%=0
   :GCOL 0,15
180 MOVE 595,160
   :PLOT 1,-30,30
   :MOVE 595,160
   :PLOT 1,-30,-10
190 MOVE 621,160
   :PLOT 1,30,30
   :MOVE 621,160
   :PLOT 1,30,-10
200 VDU 23,224,&FF,&FF,&FF
   ,&FF,&FF,&FF,&FF,&FF
210 VDU 23,225,24,24,24
   ,24,60,60,60,&FF
220 VDU 23,226,24,60,126
   ,255,255,126,60,24
230 PRINT TAB(9,27);
   :VDU 225,8,10
   :FOR N%=0TO 2
   :COLOUR (RND(6))
   :VDU 224,8,10
   :NEXT
   :VDU 5
240 ENVELOPE 1,129,1,0,0
   ,200,0,0,126,0,0,12
   ,126,126
250 ENDPROC
```

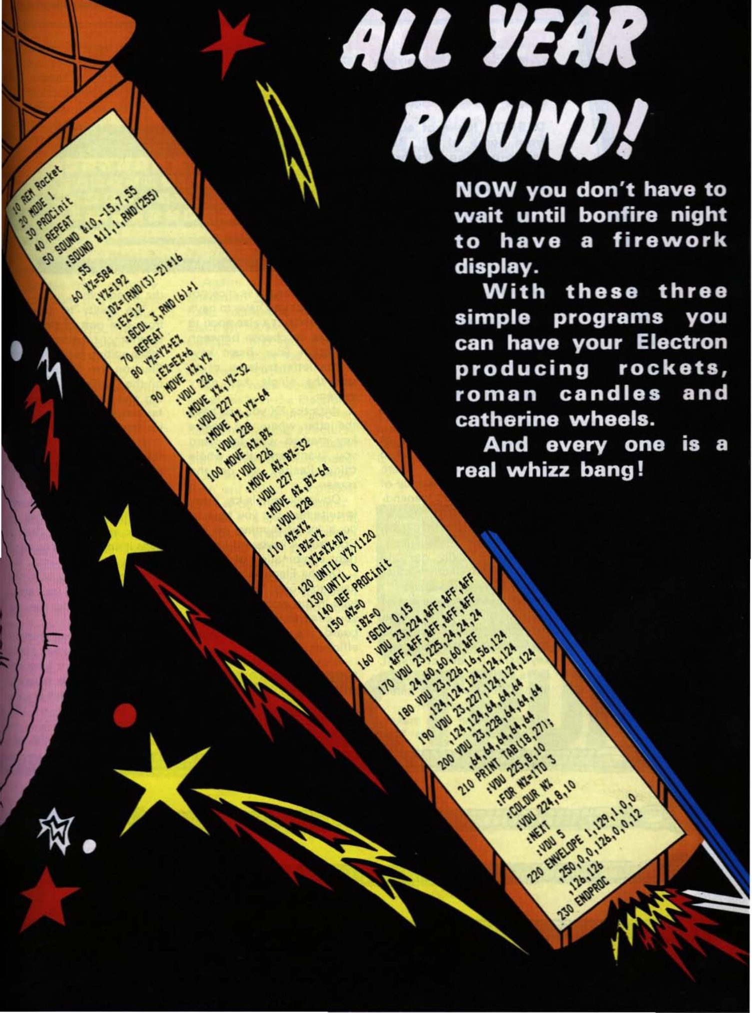
```
10 REM Wheel
20 MODE 2
70 VDU 29,640;512;
   :MOVE 0,0
   :N%=0
   :R=400
80 FOR I=20*PI TO 0
   STEP -.1
90 GCOL 0,N%
   :N%=(N%+1)MOD 15
100 MOVE 0,0
   :R=R-.5
110 PLOT 85,R*COS I,R*
   SIN I
120 NEXT
150 VDU 20
155 E=150
160 REPEAT
170 D%=0
180 FOR D%=1TO 7
190 FOR C%=1TO 15
195 E=E-.3
200 FOR N%=0 TO E
   :NEXT
210 VDU 19,C%,D%;0;
220 NEXT
222 IF E<10 E=150
225 NEXT
230 UNTIL 0
```

• WHIZZ BANGS ALL YEAR ROUND!

NOW you don't have to wait until bonfire night to have a firework display.

With these three simple programs you can have your Electron producing rockets, roman candles and catherine wheels.

And every one is a real whizz bang!



```
10 REM Rocket
20 MODE 1
30 PROCinit
40 REPEAT
50 SOUND &10,-15,7,55
  :SOUND &11,1,RND(255)
  ,55
60 X%=584
  :Y%=192
  :D%=(RND(3)-2)*16
  :E%=12
  :GCOL 3,RND(6)+1
70 REPEAT
80 Y%=Y%+E%
  :E%=E%+6
90 MOVE X%,Y%
  :VDU 226
  :MOVE X%,Y%-32
  :VDU 227
  :MOVE X%,Y%-64
  :VDU 228
100 MOVE A%,B%
  :VDU 226
  :MOVE A%,B%-32
  :VDU 227
  :MOVE A%,B%-64
  :VDU 228
110 A%=X%
  :B%=Y%
  :X%=X%+D%
120 UNTIL Y%>1120
130 UNTIL 0
140 DEF PROCinit
150 A%=0
  :B%=0
  :GCOL 0,15
160 VDU 23,224,&FF,&FF,&FF
  ,&FF,&FF,&FF,&FF,&FF
170 VDU 23,225,24,24,24
  ,24,60,60,60,&FF
180 VDU 23,226,16,56,124
  ,124,124,124,124,124
190 VDU 23,227,124,124,124
  ,124,124,64,64,64
200 VDU 23,228,64,64,64
  ,64,64,64,64,64
210 PRINT TAB(18,27);
  :VDU 225,8,10
  :FOR N%=1TO 3
  :COLOUR N%
  :VDU 224,8,10
  :NEXT
  :VDU 5
220 ENVELOPE 1,129,1,0,0
  ,250,0,0,126,0,0,12
  ,126,126
230 ENDPROC
```

ELECTRON

acorn electron

DESPITE looks of scorn from some of my BBC Micro-owning brethren I've always stuck up for Clive Sinclair's ZX Spectrum.

I think that for the money it's a great little machine and I know a lot of people are grateful to it for their introduction to the world of computers.

It's a nice micro with some good features and I've had a great deal of fun with it.

Given my affection for the Spectrum, I was intrigued about the new Electron, much vaunted as a rival to Uncle Clive's machine.

Would it be as good as the Spectrum or better? And if it was a better micro would the cost difference of some £75 to £100 (depending on which model Spectrum you take) be justified?

When I finally got my hands on an Electron I just had to do a comparison.

The first thing you notice when you come to the Electron after using a Spectrum is that it has a real keyboard. In fact at first it looks like that's all it is, but a little experience soon cures that misapprehension!

Using proper keys makes a real change from tne Spectrum, and it is nice not to feel that you have to have three hands. It's also good to be able to choose between typing in your Basic keywords letter-by-letter or to use the single key entry system.

With the ZX you just have the latter, where you press a key marked with the word you want and the whole thing flashes up on the screen.

Obviously single key entry is quite fast, but you have to do a lot of hunting on the Spectrum's keyboard for the right combination of keys.

On the Electron you don't have to worry. You can just type in the word you want if you can't find it on the keyboard. It's easier and more efficient.

Not only does the Electron score with its keyboard, but when you've entered a program you have a far better system of editing, or modifying, it than on the Spectrum.

The ability to copy text from one part of the screen to another together with the other editing facilities on the Electron are far better than on the ZX. This makes entering and amending programs far simpler and is a big plus for the Acorn machine.

Having said that, one thing the Spectrum does that the Electron doesn't is to check each line of a program before it is entered.

If there is a mistake, or syntax error, in the Basic it flags it and lets you correct it before it goes into the micro's memory. On the Electron you find your errors when you try to run the program.

This can be very frustrating when you've made several errors in a long listing like a games program. So the syntax check is a big plus in favour of the Spectrum.

But that is about the only

area where it does score – except, perhaps, that the more expensive Spectrum has 16k more memory than the Electron. Even so the Electron has 16k more memory than the cheaper rival, so they come out equal.

It's in the Basic that the Electron uses and the graphics facilities provided that it wins hands down.

The language that the Spectrum uses, ZX Basic, is a useful language and, as you can see from software produced using it, it can do a lot of clever things. But, compared with BBC Basic – the dialect of Basic the Electron uses – it is fairly primitive.

The Basic you get with the Electron is far more powerful and flexible. It allows you to produce your programs in what is known as a structured manner.

V.

What this means is that it allows the development of programs in a logical and easy-to-follow style.

ZX Basic doesn't really lend itself to structured programming. This is a major drawback in a micro aimed at beginners. ZX Basic leads almost inevitably to poor programming habits – the lack of facilities it provides ensures this.

The Electron, with its superior Basic, will allow and encourage learners to program properly from the start. They'll thus avoid the development of the bad habits which our university computer departments have been warning us about for some time.

For someone who is at the start of what might be a lifetime in programming this is very much in the Electron's favour.

Again, to be fair, the Spectrum does have one Basic command that the Electron doesn't. This is CIRCLE – and very useful it is too. To state the obvious, it draws a circle!

A pity room couldn't be found for it in the Electron's vocabulary. Still the Electron has so many other structures which the Spectrum doesn't that it comes out way ahead.

What of the graphics? Both are colour computers, so how do they compare?

Well, I've always liked the Spectrum graphics facilities and found them easy to use and understand. But comparison with the graphics on the Electron with its seven modes and advanced commands shows that, here again, the Electron has the edge.

It's not that you get more colours with the Electron, you don't. But you can do a whole lot more with the ones you've got and they fill the whole screen.

Also, the graphics are a lot faster (though, again, the lack of a CIRCLE command is annoying). And you can define separate text and graphics windows on the screen, which is invaluable in creating good displays.

The additional graphics commands supplied with the Electron leave the Spectrum standing. They are just so much better.

It's a similar tale with the sound generator. The aptly-named BEEP command on the Spectrum can be made to do quite a lot, but it won't stand comparison with the Electron's SOUND command, which is far more versatile. When you combine it with the ENVELOPE com-

ZX Spectrum

SPECTRUM

Nigel Peters

From Page 11

mand you move into a whole new dimension of sound generation.

Probably by now you'll have realised that I think that the Electron is a far superior beast to the Spectrum.

In all the areas discussed so far it has provided better facilities. However, I haven't yet mentioned the feature that appeals to me most about the Electron, a feature that the Spectrum just hasn't got.

This is the powerful 6502 assembler built into the Electron. Using this the seemingly formidable task of learning machine code language can be brought down to size.

And it's this point that should appeal to people who are buying a micro for the first time. Sooner or later, as their command of the micro increases, they will want to move on to using the language that the micro itself uses, machine code.

The Electron's assembler provides a fairly straightforward entry into this area. Sadly, while the assembler is one of the best features of the Electron, the very beginners who will benefit from it probably don't know enough about micros to appreciate just what they are getting. A pity, because the Spectrum has nothing comparable.

In lots of other ways the Electron scores over the Spectrum. Its RGB socket for output to a colour monitor and the video output are features the Spectrum lacks.

The system which allows storage of programs on cassette is far superior on the Electron. Then there's an internal clock, and the multiway adaptor provided at the back of the Electron promises far greater expansion possibilities than on the Spectrum.

In fact it will eventually be possible to turn your Electron into a fairly respectable copy of its big brother, the BBC Micro.

All in all, the Electron wins hands down. However, which is the better value for money? Are the extra features that you get worth the £70?

In my opinion they are. For anyone who can afford the choice and who wants a serious introduction to micros then the machine to go for is the Electron.

It comes down to this – the Spectrum is a good micro, but the Electron is a far better one.

Counting's child's play

With a little help from their parents

COUNTING is a simple, fun to play, learning game for very young children.

The program puts between one and nine "counters" on the screen for the child to count. The player presses the number calculated and, with appropriate noises for right and wrong, the computer counts out the counters.

To have another go press the space bar. To finish press escape.

Beware, though, because it's not a game for children on their own. So parents should make sure you've got plenty of free time.

Children learn most by discussing their experiences with others. This program is designed to make full use of a child's most important educational resource – you!

```
 10 REM COUNTING
 20 REM (C) ELECTRON USER
 30 MODE 1
 40 DIM XPOS%(9),YPOS%(9)
 50 ENVELOPE 3,4,90,-15
    ,-15,10,20,20,126,0
    ,0,-126,126,126
 60 ENVELOPE 5,1,70,6,0
    ,31,10,0,126,0,0,-126
    ,126,126
 70 VDU 19,0,3,0,0,0
 80 VDU 19,3,4,0,0,0
 90 VDU 23,224,1,3,7,15
    ,31,63,127,255
100 VDU 23,225,127,63,31
    ,15,7,3,1,0
110 VDU 23,226,252,248,240
    ,224,192,128,0,0
120 VDU 23,227,0,128,192
    ,224,240,248,252,254
130 SHAPE$=CHR$ (224)+
    CHR$ (227)+CHR$ (10)+
    CHR$ (8)+CHR$ (8)+
    CHR$ (225)+CHR$ (226)
140 REPEAT
150 CLS
160 NUMBER%=RND(9)
170 YSTEP%=31/NUMBER%
180 FOR LOOP%=1 TO NUMBER%
190 XPOS%(LOOP%)=RND(38)
200 YPOS%(LOOP%)=RND(YSTEP%-2)
210 COLOUR 1
220 PRINT TAB(XPOS%(LOOP%)
    ,(YSTEP%*(LOOP%-1)+YPOS%(
    LOOP%))) SHAPE$
230 NEXT
240 REPEAT
    :ANSWER$=GET$
    :UNTIL INSTR("123456789"
    ,ANSWER$)
250 IF VAL (ANSWER$)=NUMBER%
    THEN SOUND 1,3,100,-1
    ELSE SOUND 1,5,100,-1
260 COLOUR 3
270 FOR LOOP%=1 TO NUMBER%
280 PRINT TAB(XPOS%(LOOP%)
    ,(YSTEP%*(LOOP%-1)+YPOS%(
    LOOP%)));LOOP%
290 WAIT%=TIME
    :REPEAT UNTIL TIME >100+W
    AIT%
300 NEXT
310 *FX15,0
320 A$=GET$
330 UNTIL FALSE
```

SOUNDS.. EXCITING

BUILD up a library of exciting sounds to enhance your own programs with these listings. And many more in the months to come!

CRASH!

```
SOUND 0. 5. 4. 10
ENVELOPE 5. 6. 2. 20. 16, 16. 0, 0,
126, 0, 0, -126. 126, 126
```

IN THE FACTORY

```
SOUND 0, 1. 1. 50
ENVELOPE 1. 5, 1, 20. B. 200. 0. 0.
126. 0.0.-126, 126. 126
```

GOING UP!

```
SOUND 1. 4, 30, 36
ENVELOPE 4. 16, 16, 1, 1. 200. 0. 0,
126. 0, 0, -126, 126. 126
```

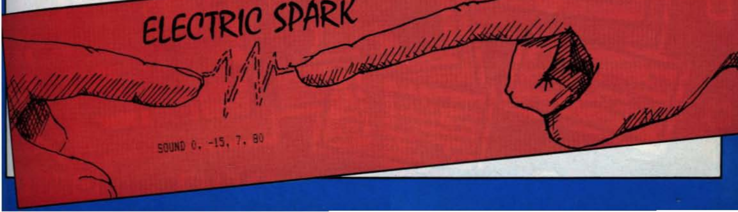
FANFARE

```
SOUND 1, 2, 4, 50
ENVELOPE 2, 2, 6. 0. 0, 255. 0, 0.
126. 0. 0, -126, 126, 126
```

RED ALERT

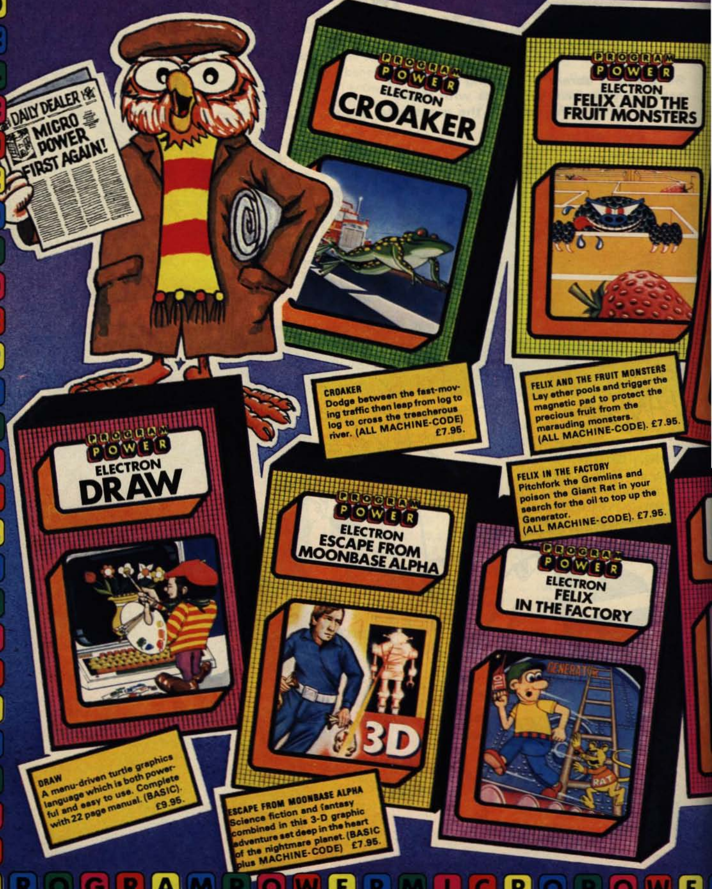
```
SOUND 0, 3, 7, 80
ENVELOPE 3, 3, 6. 0, 1, 255, 0, 0,
126, 0, 0. -126. 126. 126
```

ELECTRIC SPARK



```
SOUND 0. -15, 7. 80
```

...‘READ ALL ABOUT IT...
TITLES NOW AVAILABL


DAILY DEALER
MICRO POWER FIRST AGAIN!
PROGRAM POWER
ELECTRON
CROAKER
PROGRAM POWER
ELECTRON
FELIX AND THE FRUIT MONSTERS
PROGRAM POWER
ELECTRON
DRAW
PROGRAM POWER
ELECTRON
ESCAPE FROM MOONBASE ALPHA
3D
PROGRAM POWER
ELECTRON
FELIX IN THE FACTORY
GENERATOR
OIL
RAT

CROAKER
Dodge between the fast-moving traffic then leap from log to log to cross the treacherous river. (ALL MACHINE-CODE) £7.95.

FELIX AND THE FRUIT MONSTERS
Lay ether pools and trigger the magnetic pad to protect the precious fruit from the marauding monsters.
(ALL MACHINE-CODE). £7.95.

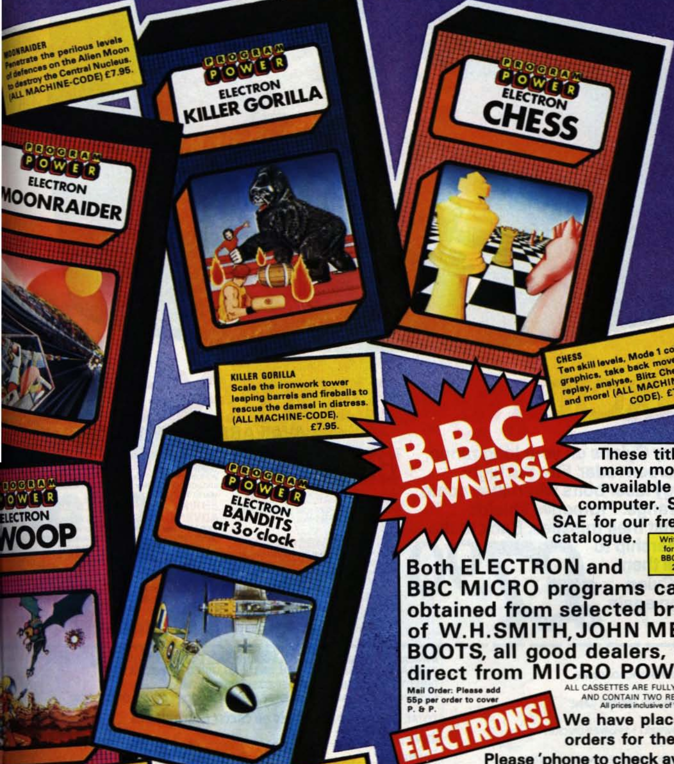
FELIX IN THE FACTORY
Pitchfork the Gremlins and poison the Giant Rat in your search for the oil to top up the Generator.
(ALL MACHINE-CODE). £7.95.

DRAW
A menu-driven turtle graphics language which is both powerful and easy to use. Complete with 22 page manual. (BASIC). £9.95.

ESCAPE FROM MOONBASE ALPHA
Science fiction and fantasy combined in this 3-D graphic adventure set deep in the heart of the nightmare planet. (BASIC plus MACHINE-CODE) £7.95.

PROGRAMPOWERMICROPOWER

MICRO POWER'S LEADING FOR THE ELECTRON'....


PROGRAM POWER
ELECTRON
KILLER GORILLA
PROGRAM POWER
ELECTRON
CHESS
PROGRAM POWER
ELECTRON
MOONRAIDER
PROGRAM POWER
ELECTRON
SWOOP
PROGRAM POWER
ELECTRON
BANDITS at 3o'clock

MOONRAIDER
Penetrate the perilous levels of defences on the Alien Moon to destroy the Central Nucleus. (ALL MACHINE-CODE) £7.95.

KILLER GORILLA
Scale the ironwork tower leaping barrels and fireballs to rescue the damsel in distress. (ALL MACHINE-CODE). £7.95.

CHESS
Ten skill levels, Mode 1 colour graphics, take back moves, replay, analyse, Blitz Chess, and more! (ALL MACHINE-CODE). £7.95.

SWOOP
Defend the space lanes against wave after wave of relentless, screaming, egg-laying Birdmen. (ALL MACHINE-CODE) £7.95.

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Aerial combat challenge in the skies over Belgium in this two player game of dexterity. (BASIC plus MACHINE-CODE) £6.95.

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Mail Order: Please add 55p per order to cover P. & P.

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